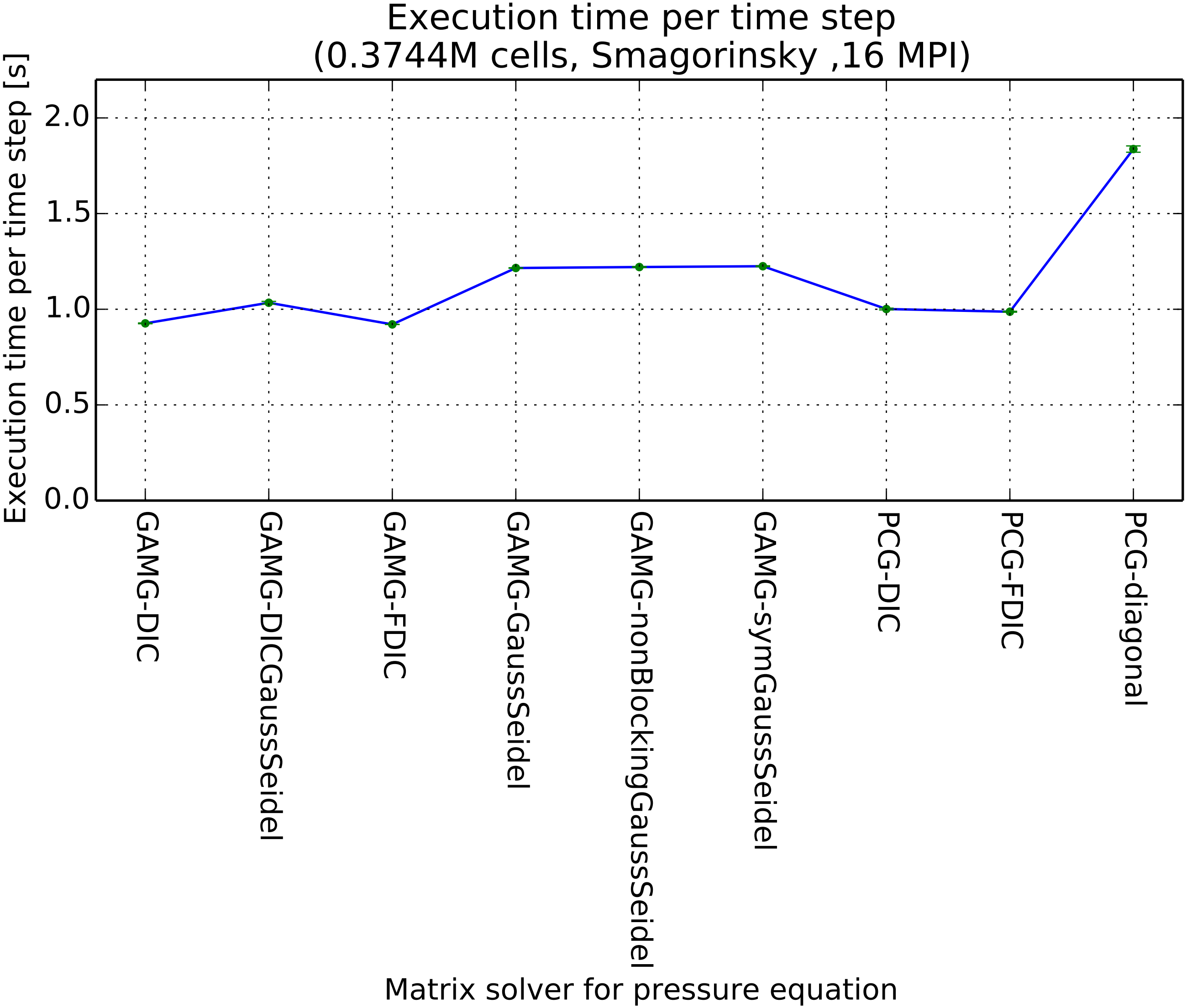
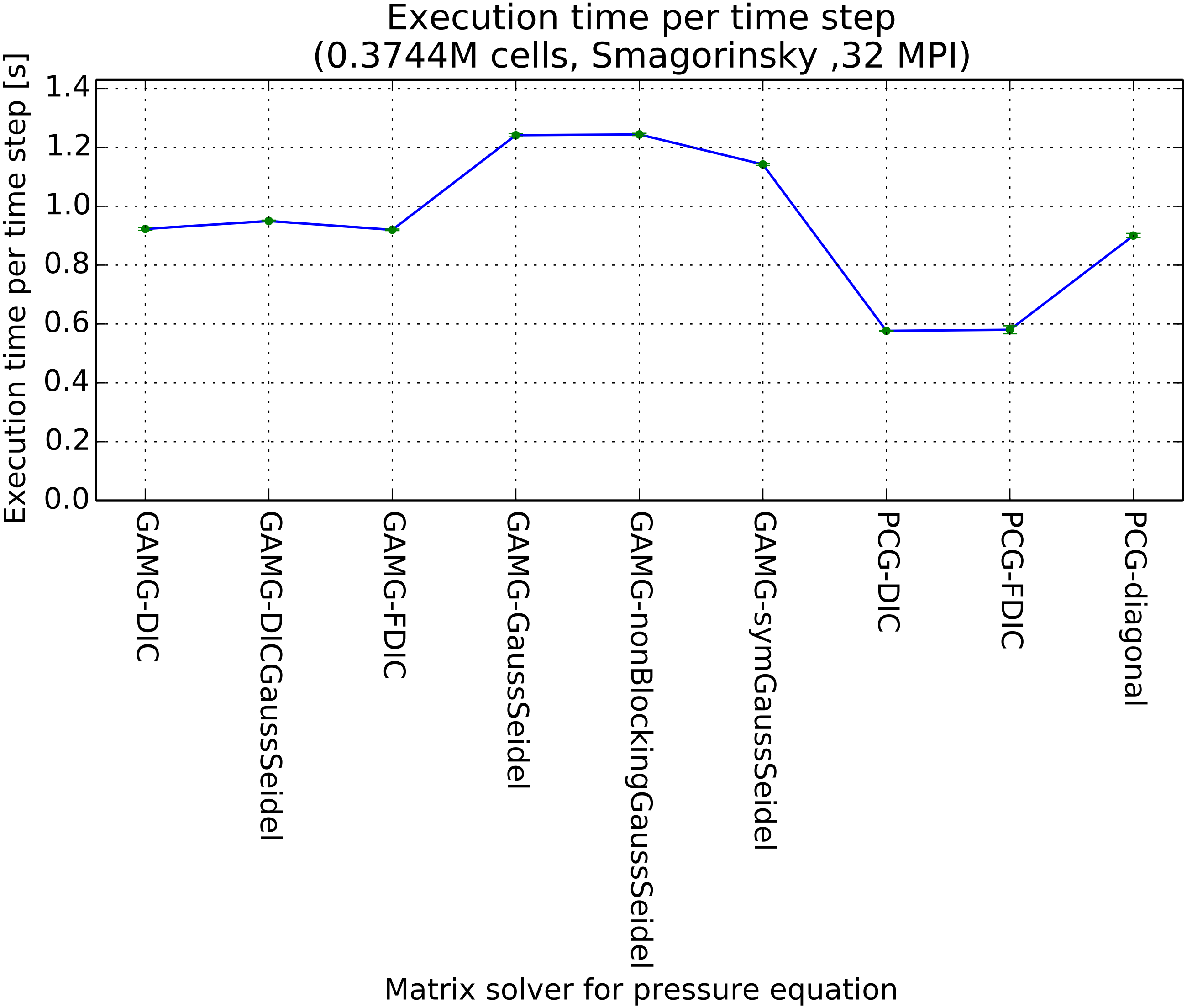
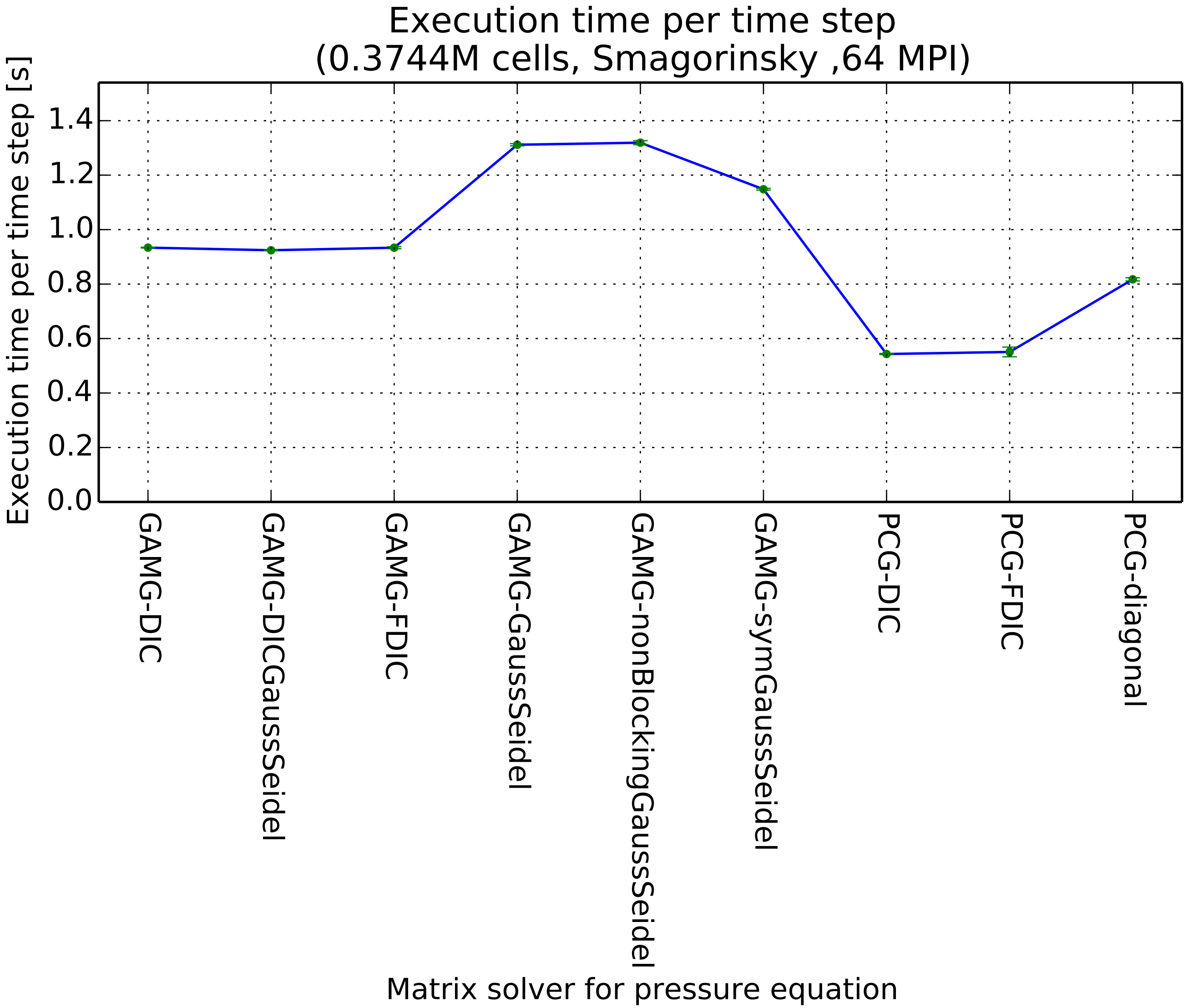
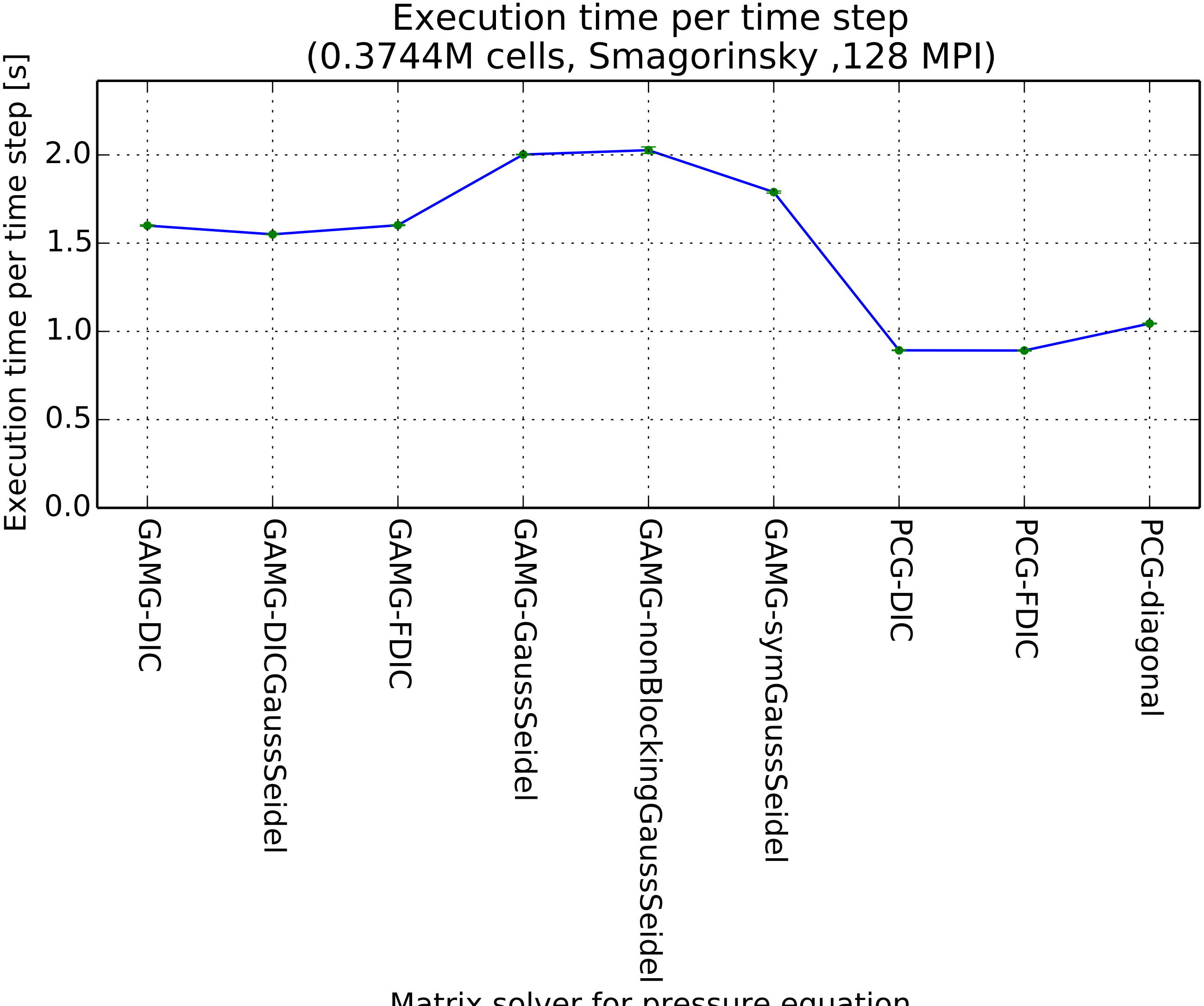
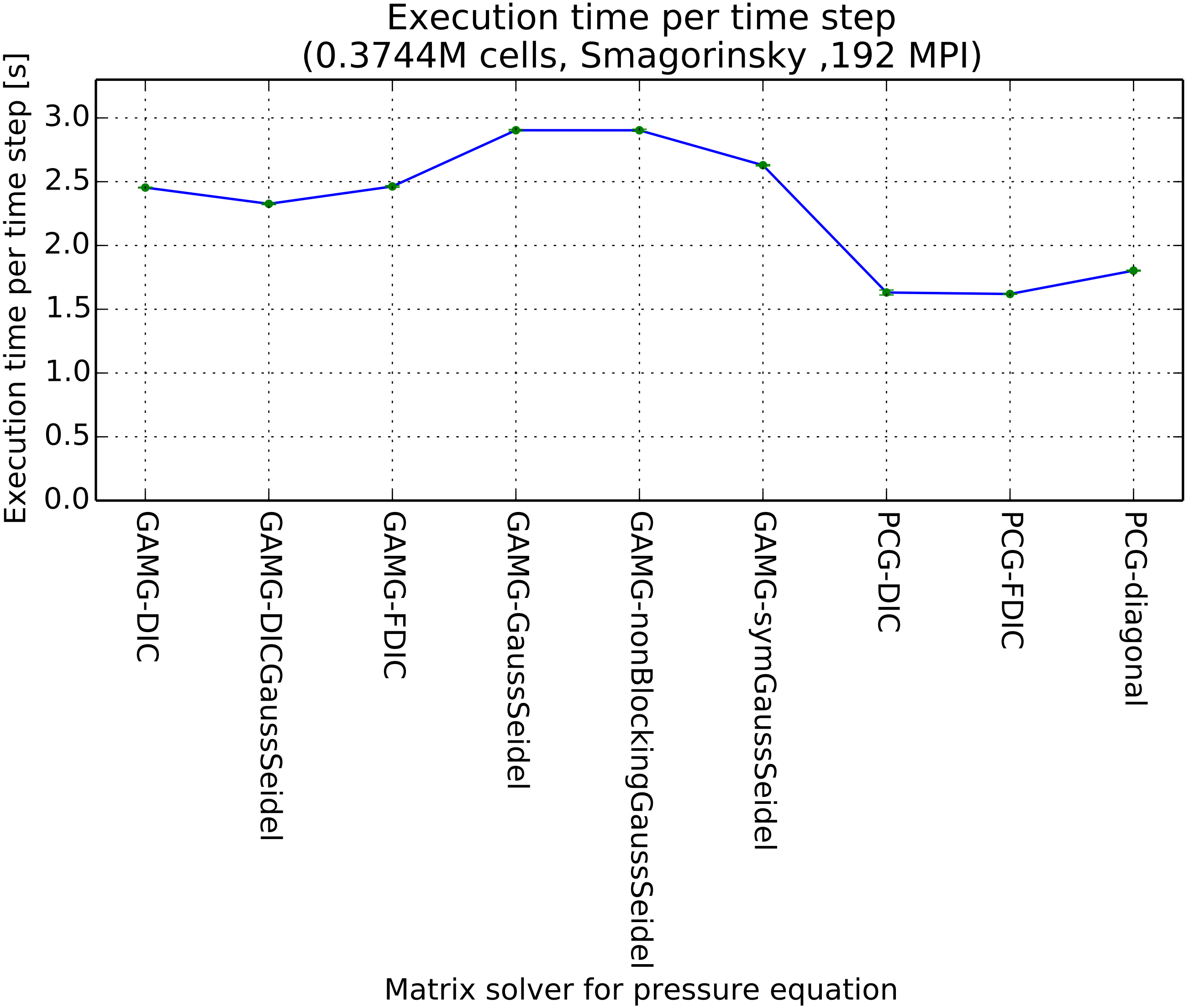
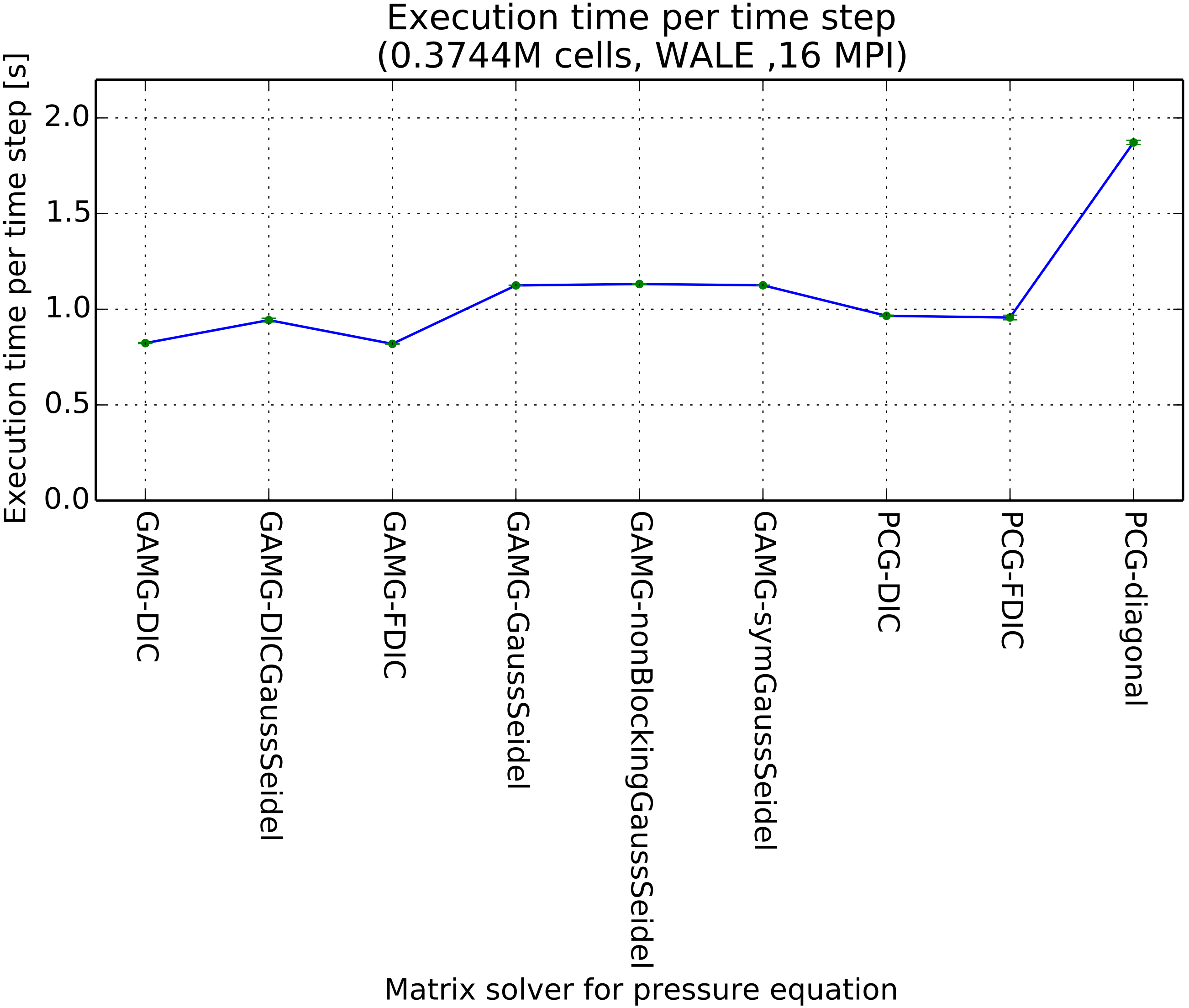
Execution time per time step
(0.3744M cells, Smagorinsky ,16 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

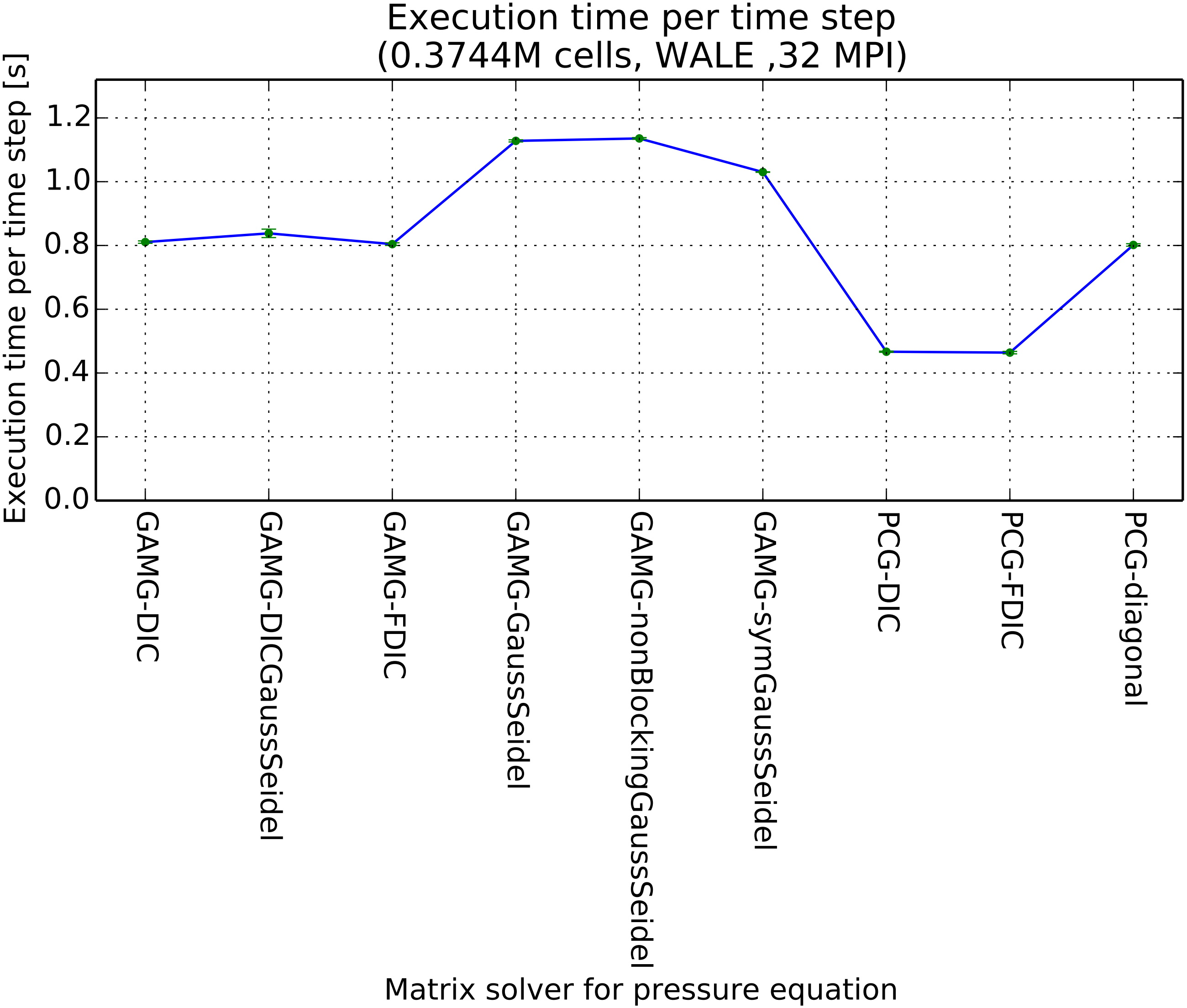

Execution time per time step
(0.3744M cells, Smagorinsky ,32 MPI)
Execution time per time step [s]
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

Execution time per time step
(0.3744M cells, Smagorinsky ,64 MPI)
Execution time per time step [s]
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

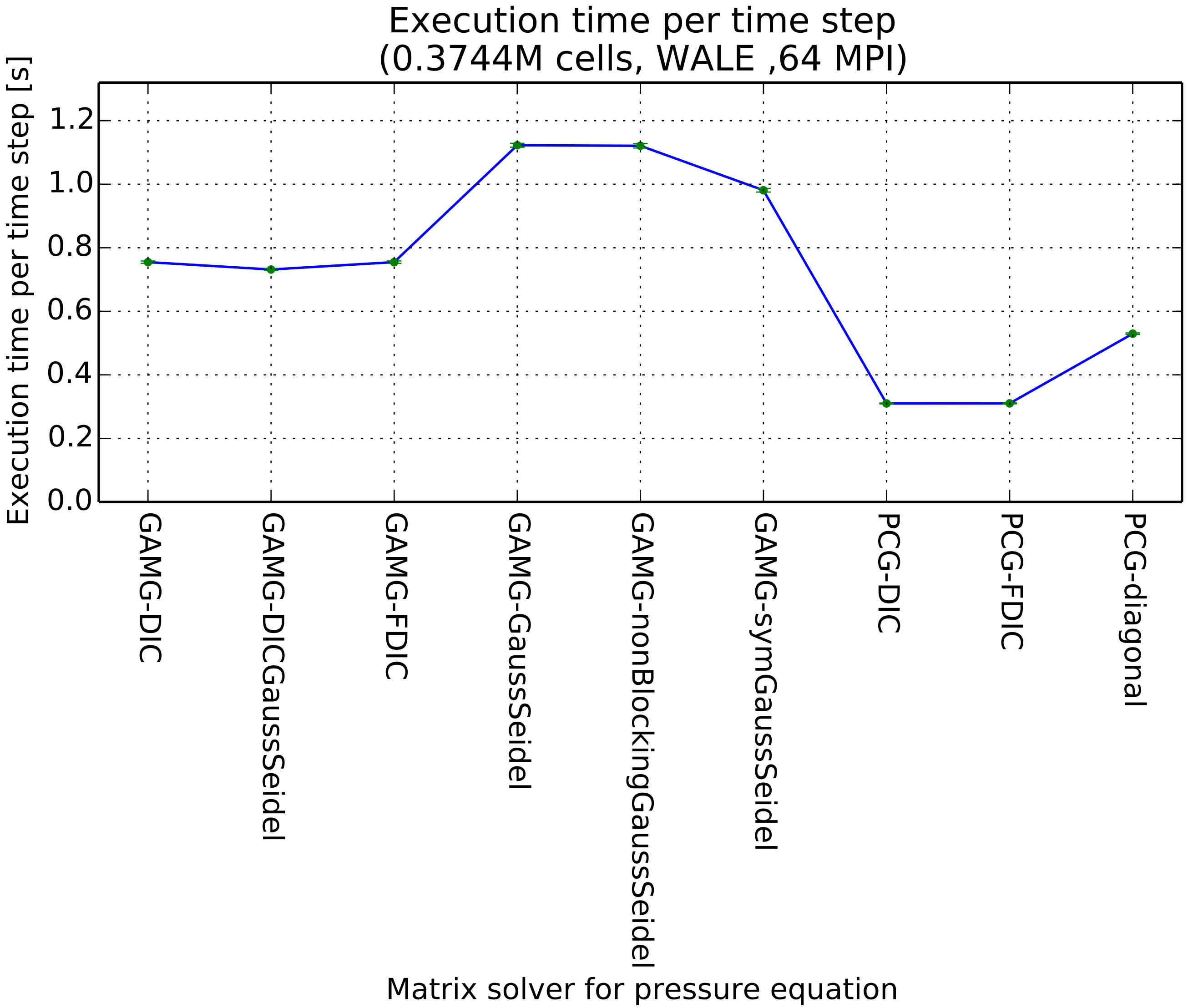

Execution time per time step
(0.3744M cells, Smagorinsky ,128 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

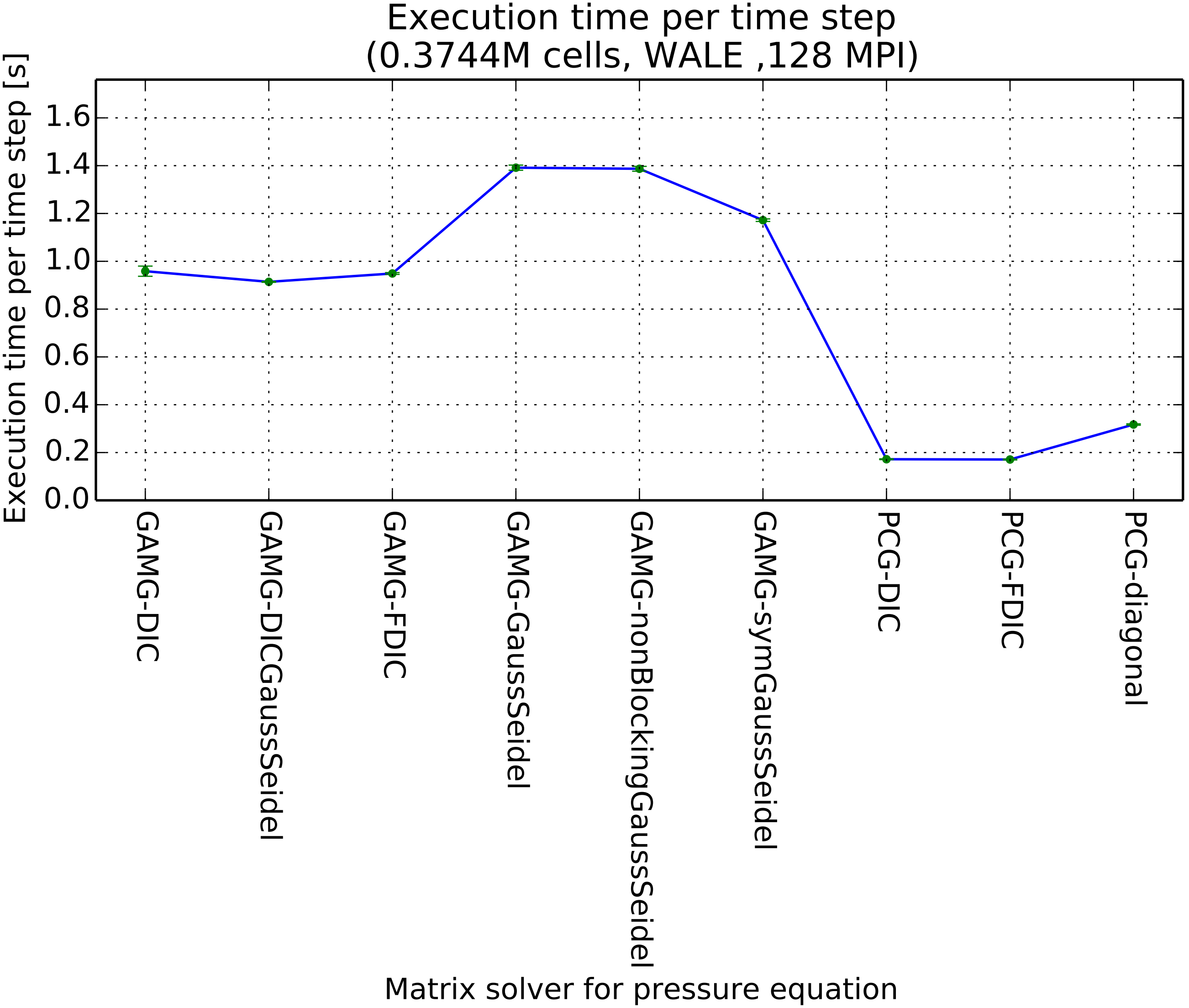

Execution time per time step
(0.3744M cells, Smagorinsky ,192 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

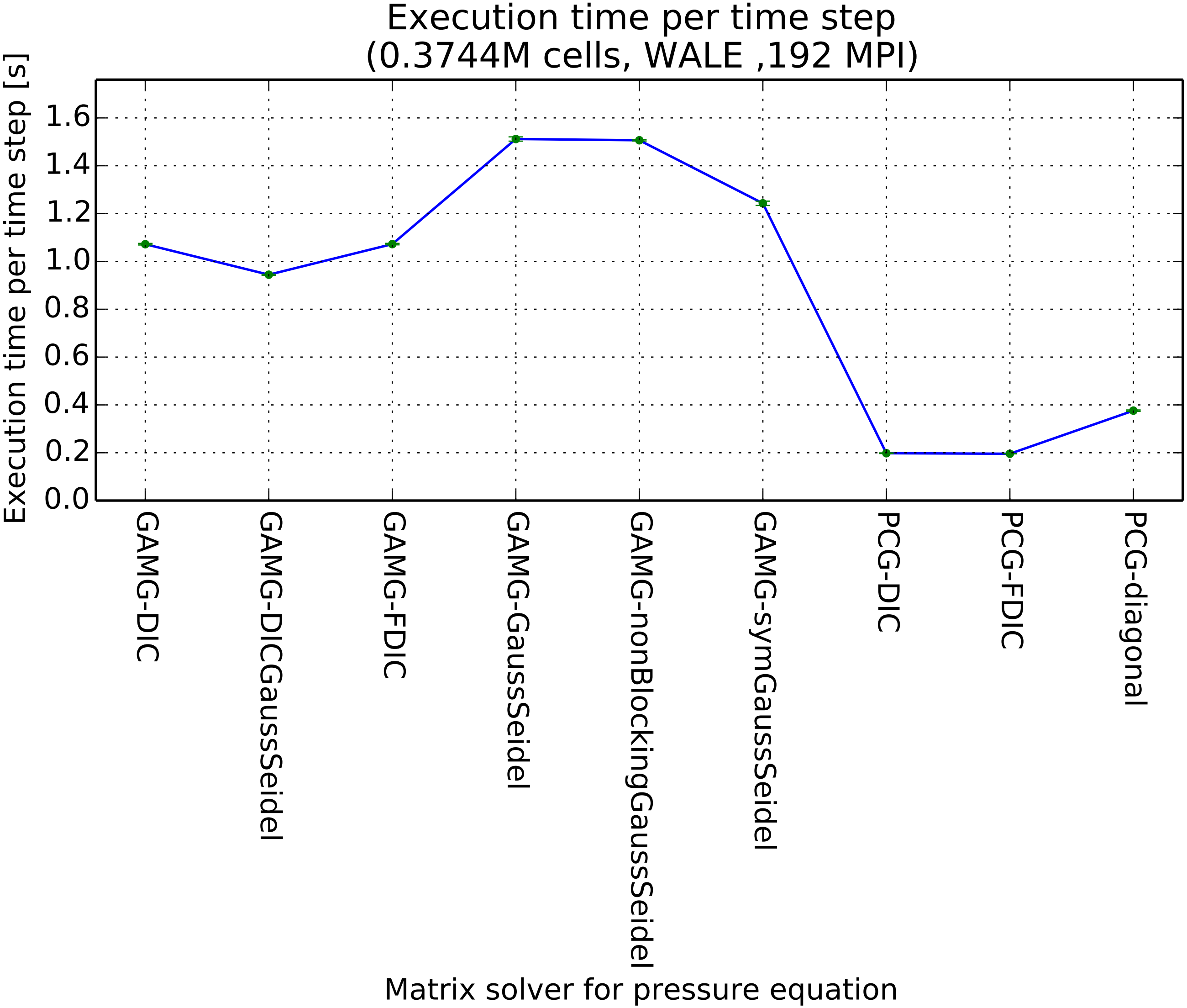

Execution time per time step
(0.3744M cells, WALE ,16 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

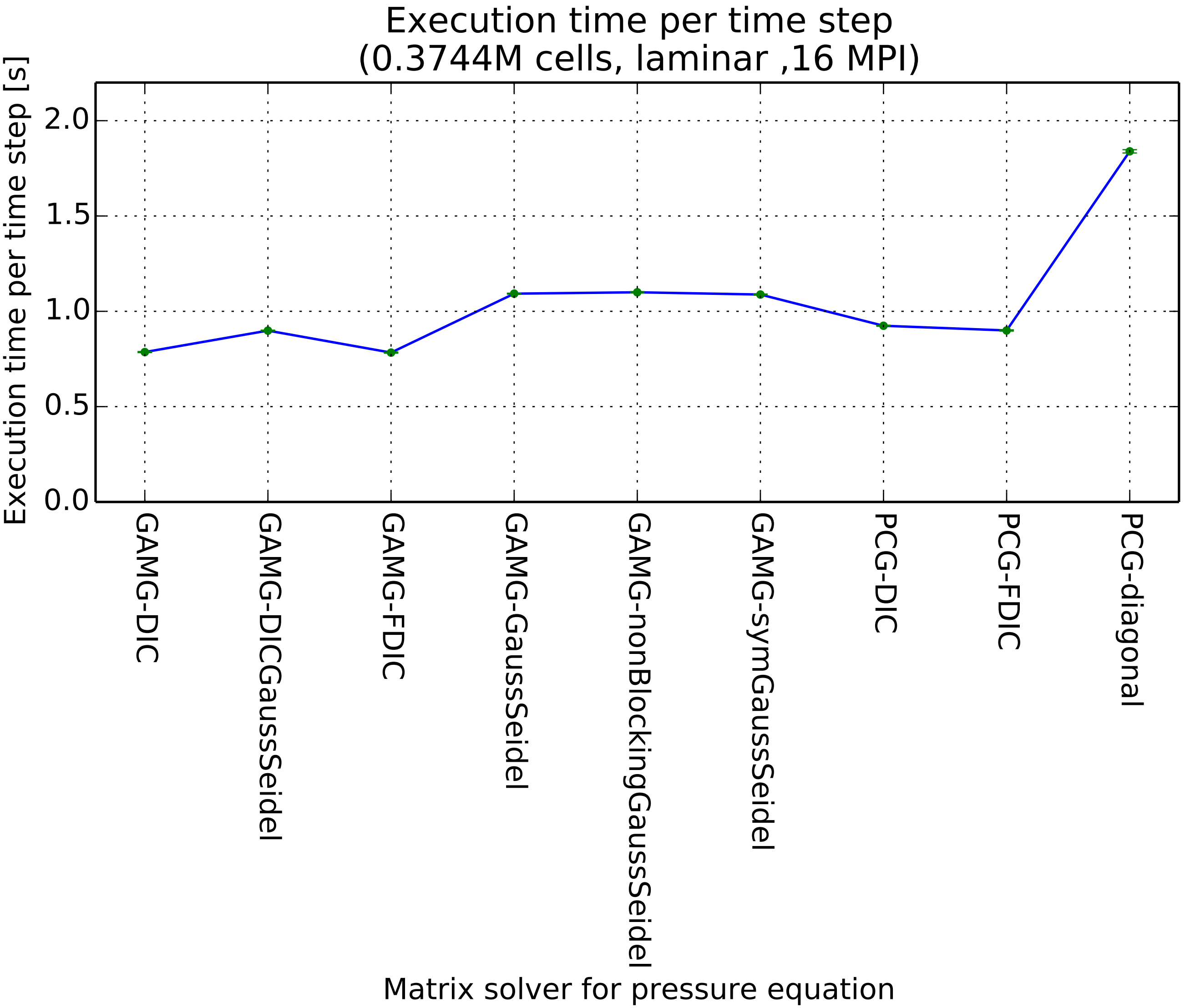


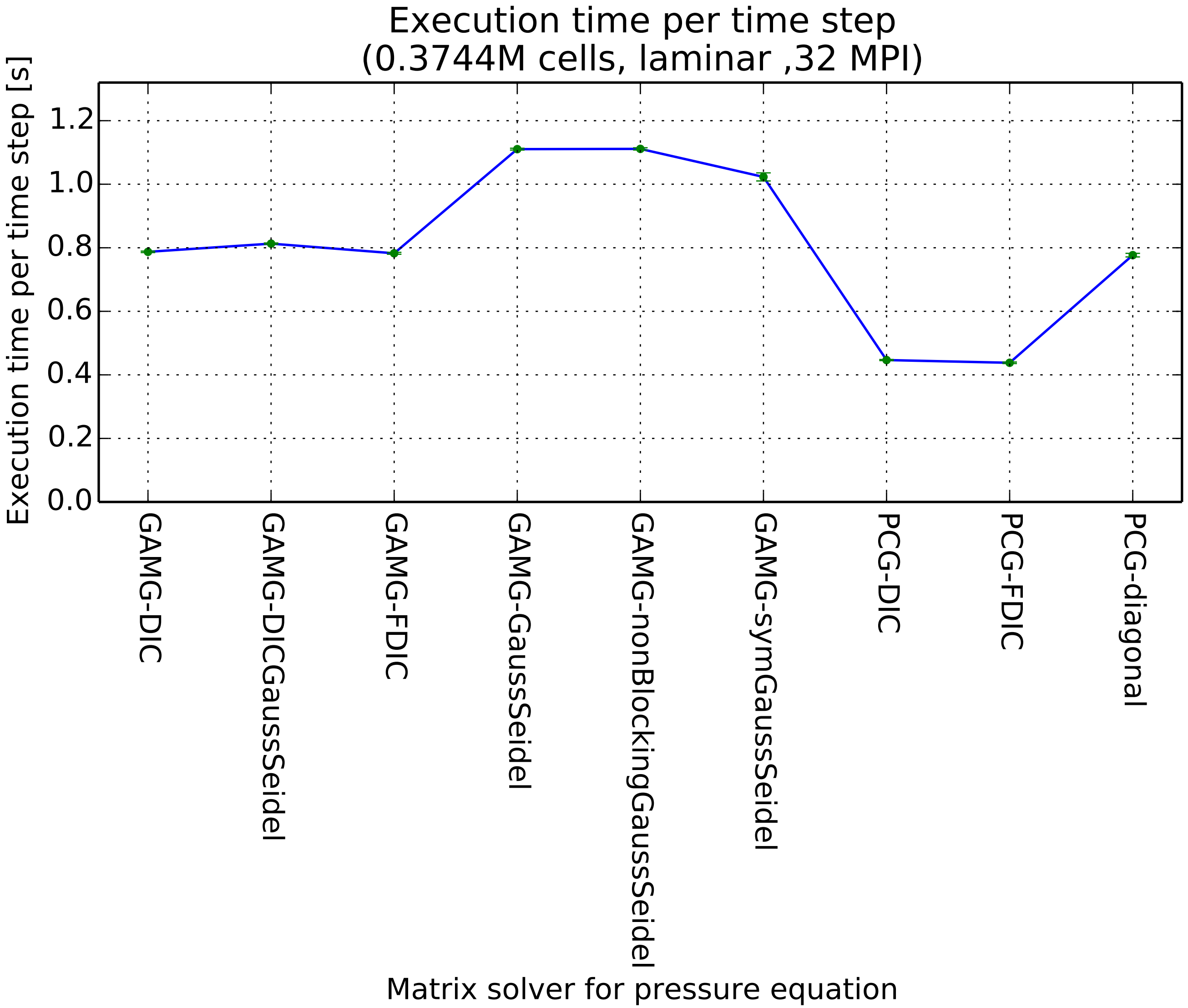
Execution time per time step
(0.3744M cells, WALE ,32 MPI)


Execution time per time step
(0.3744M cells, WALE ,64 MPI)
Execution time per time step [s]
0.0
0.2
0.4
0.6
0.8
1.0
1.2
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

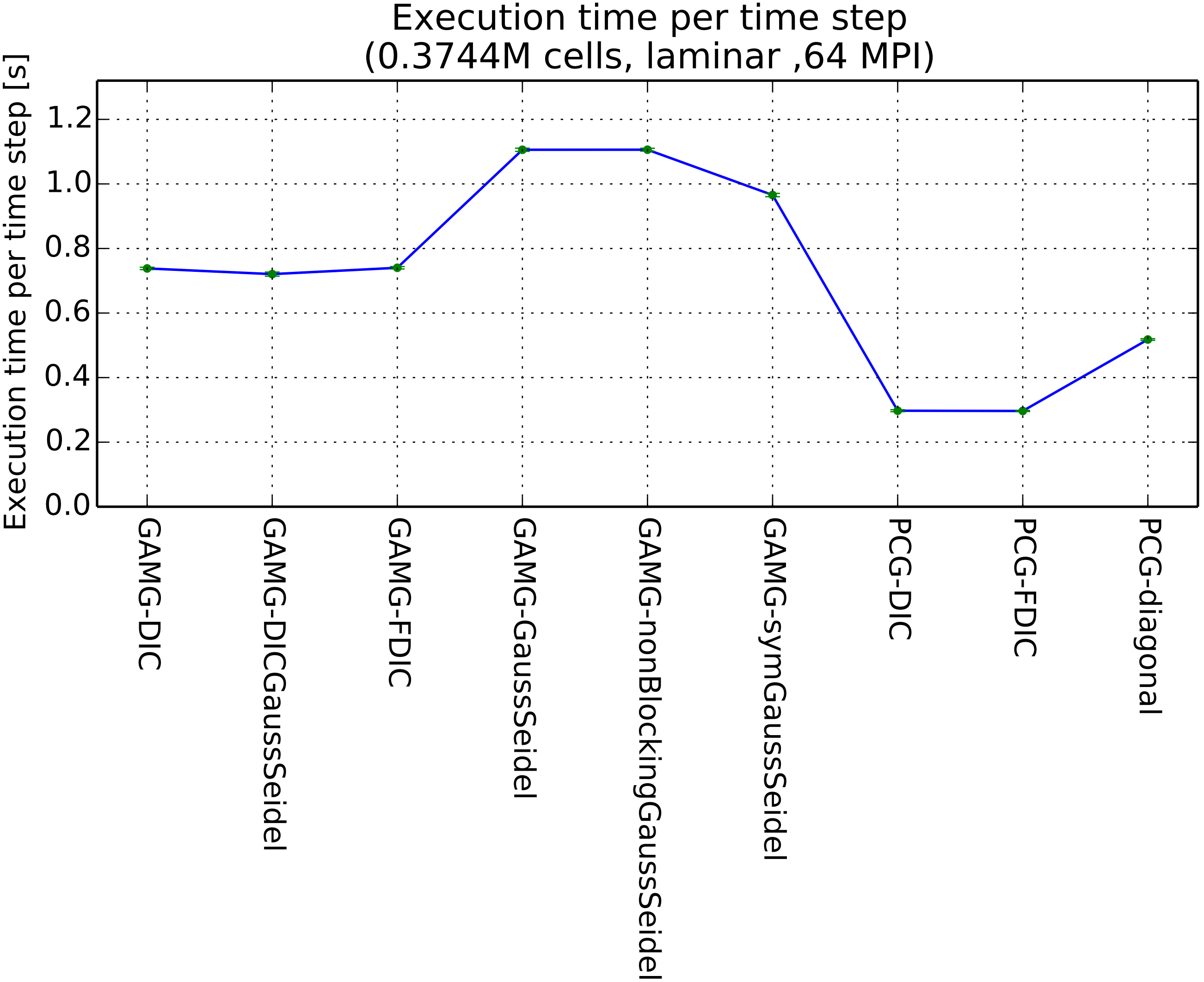

Execution time per time step
(0.3744M cells, WALE ,128 MPI)
Execution time per time step [s]
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation


Execution time per time step
(0.3744M cells, WALE ,192 MPI)
Execution time per time step [s]
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation


Execution time per time step
(0.3744M cells, laminar ,16 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation



Execution time per time step
(0.3744M cells, laminar ,32 MPI)
Execution time per time step [s]
0.0
0.2
0.4
0.6
0.8
1.0
1.2
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation


Execution time per time step
(0.3744M cells, laminar ,64 MPI)
Execution time per time step [s]
0.0
0.2
0.4
0.6
0.8
1.0
1.2
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
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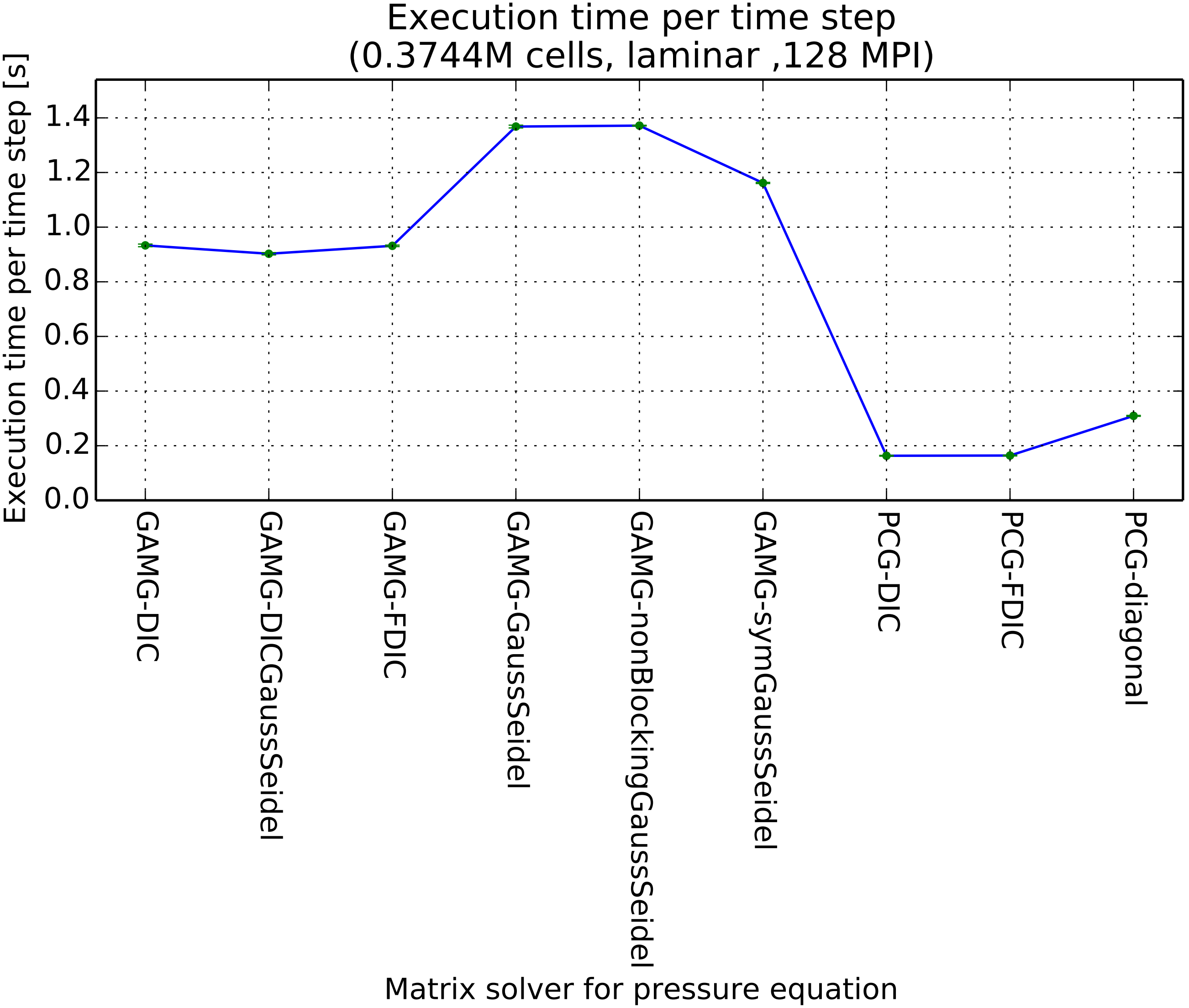
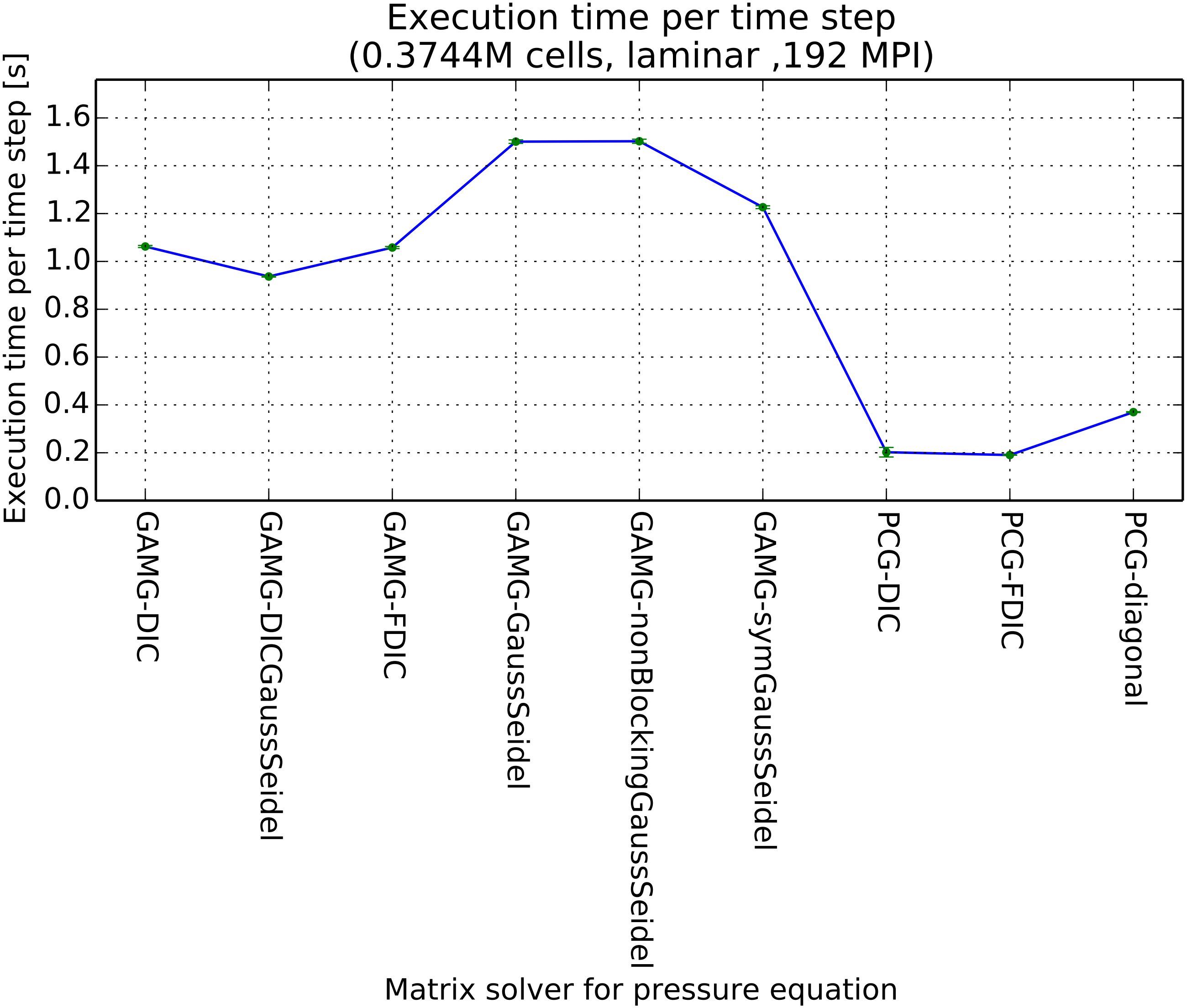
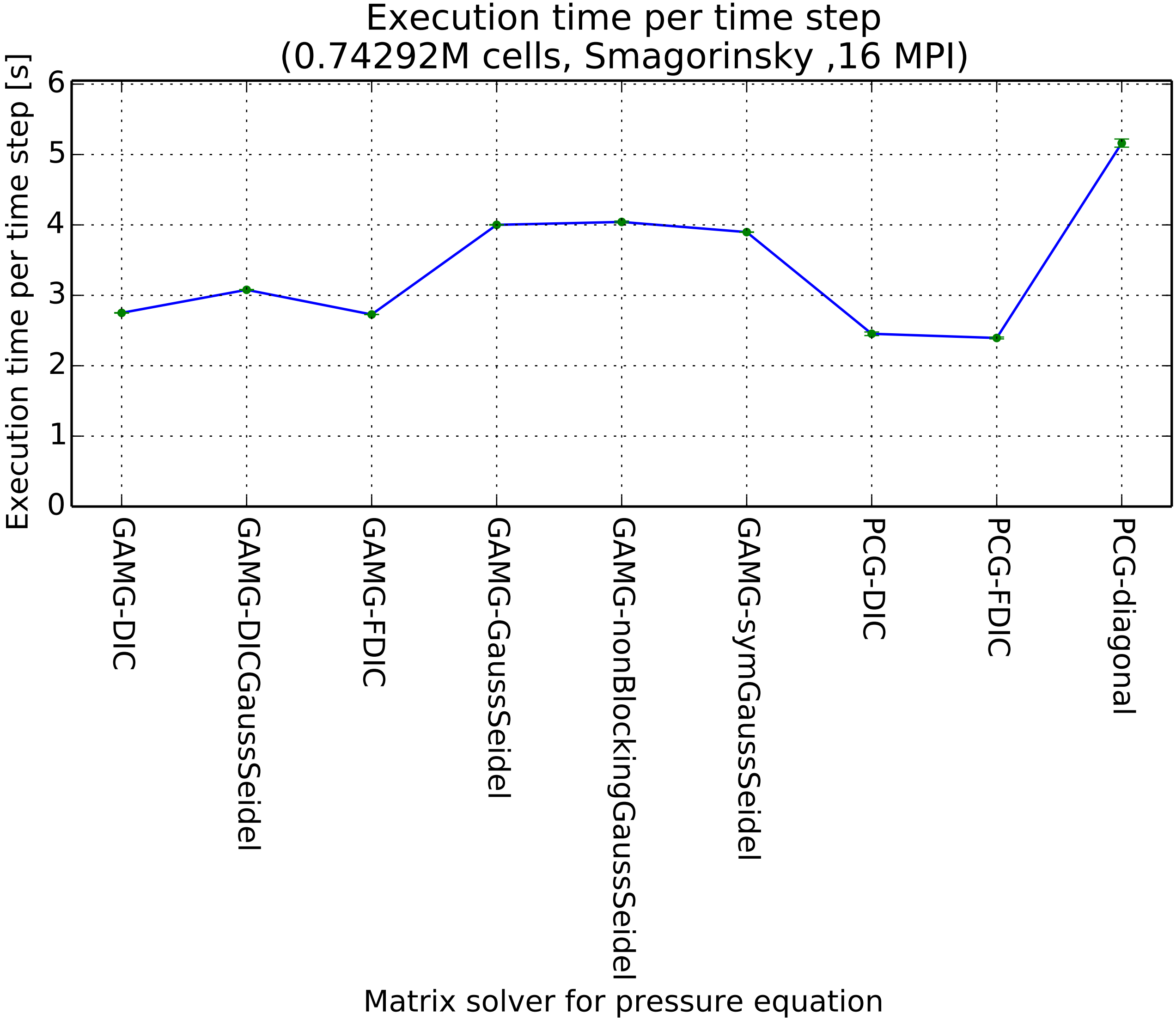
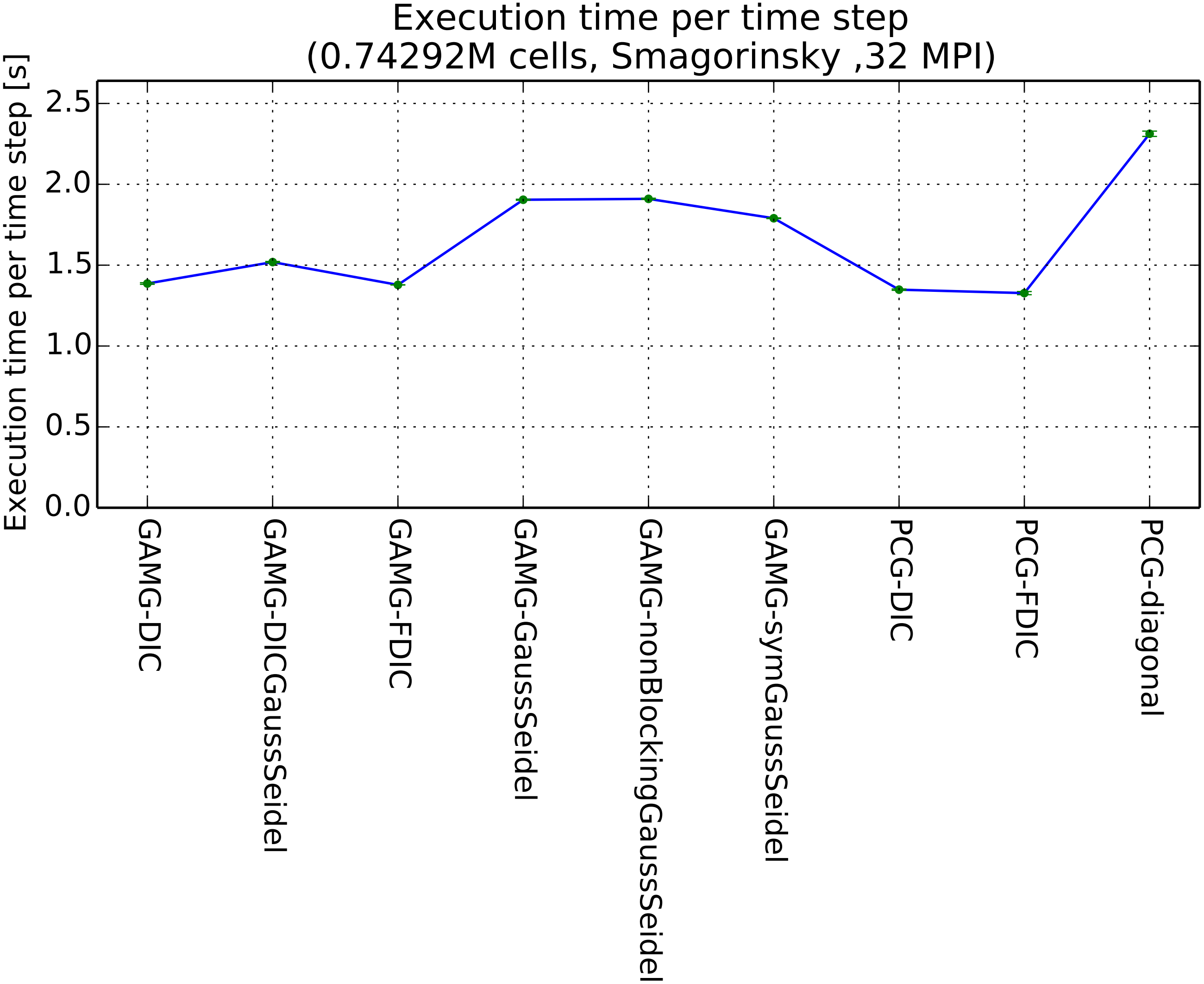
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

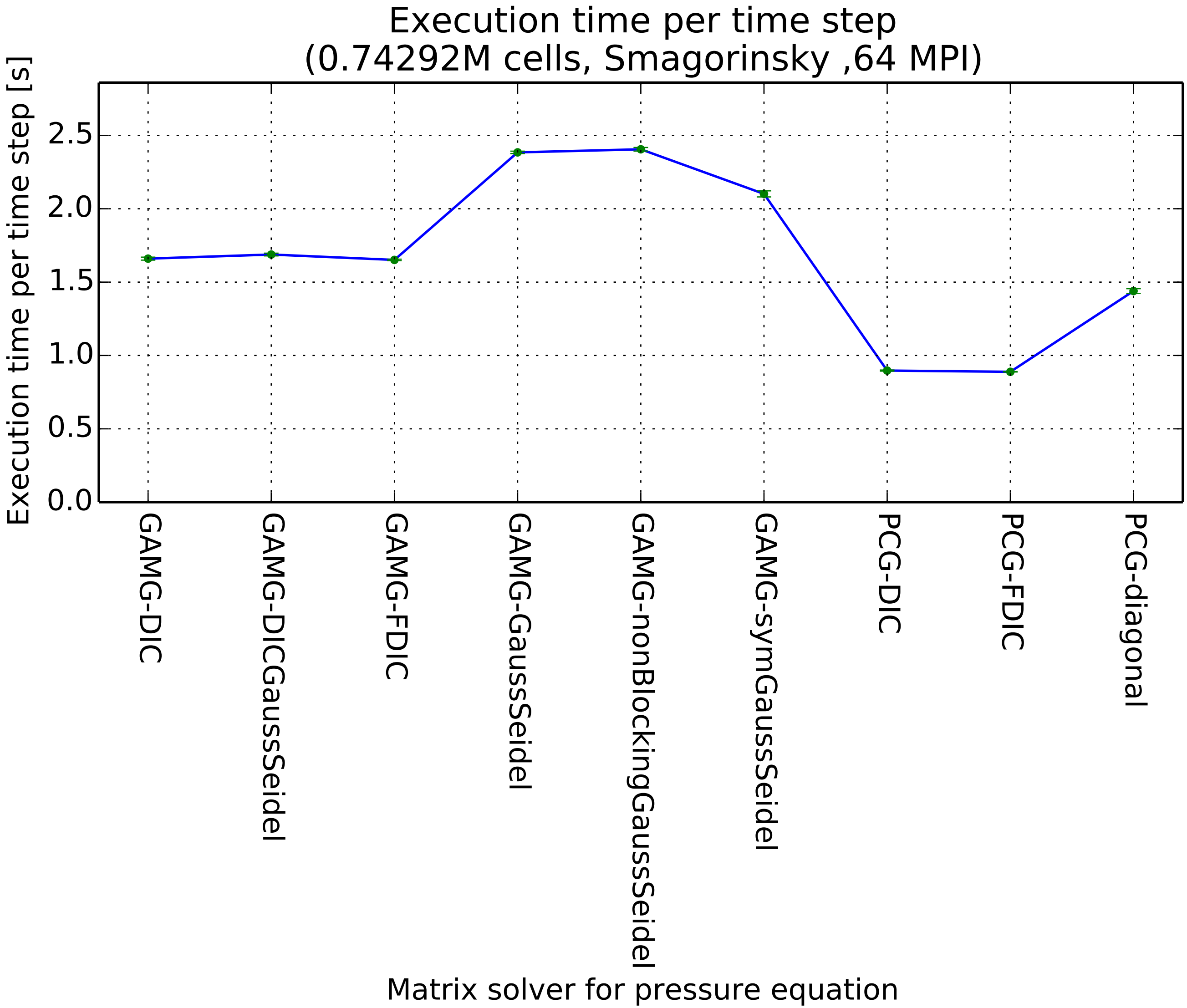
Execution time per time step
(0.3744M cells, laminar ,128 MPI)
Execution time per time step [s]
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

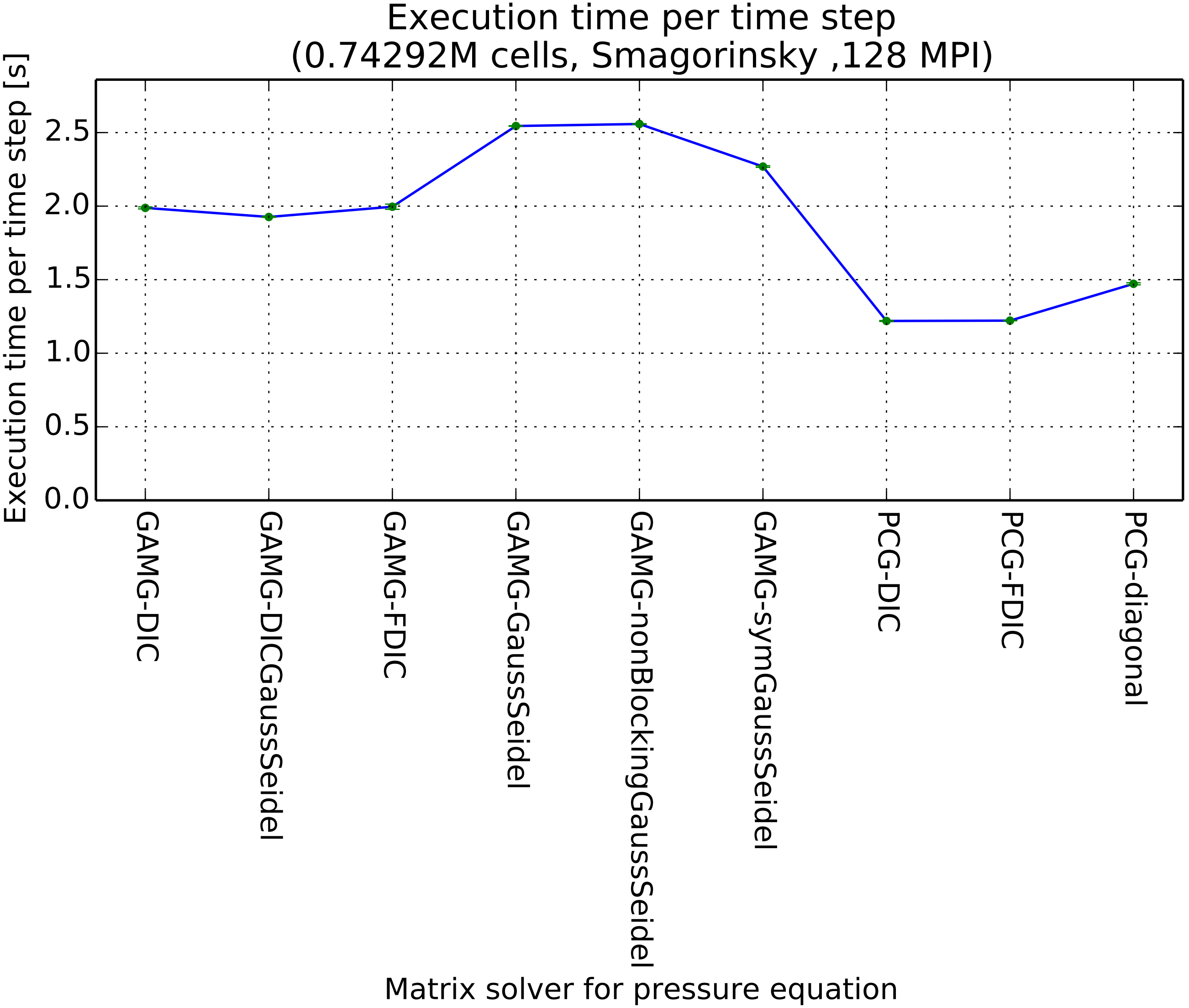

Execution time per time step
(0.3744M cells, laminar ,192 MPI)
Execution time per time step [s]
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

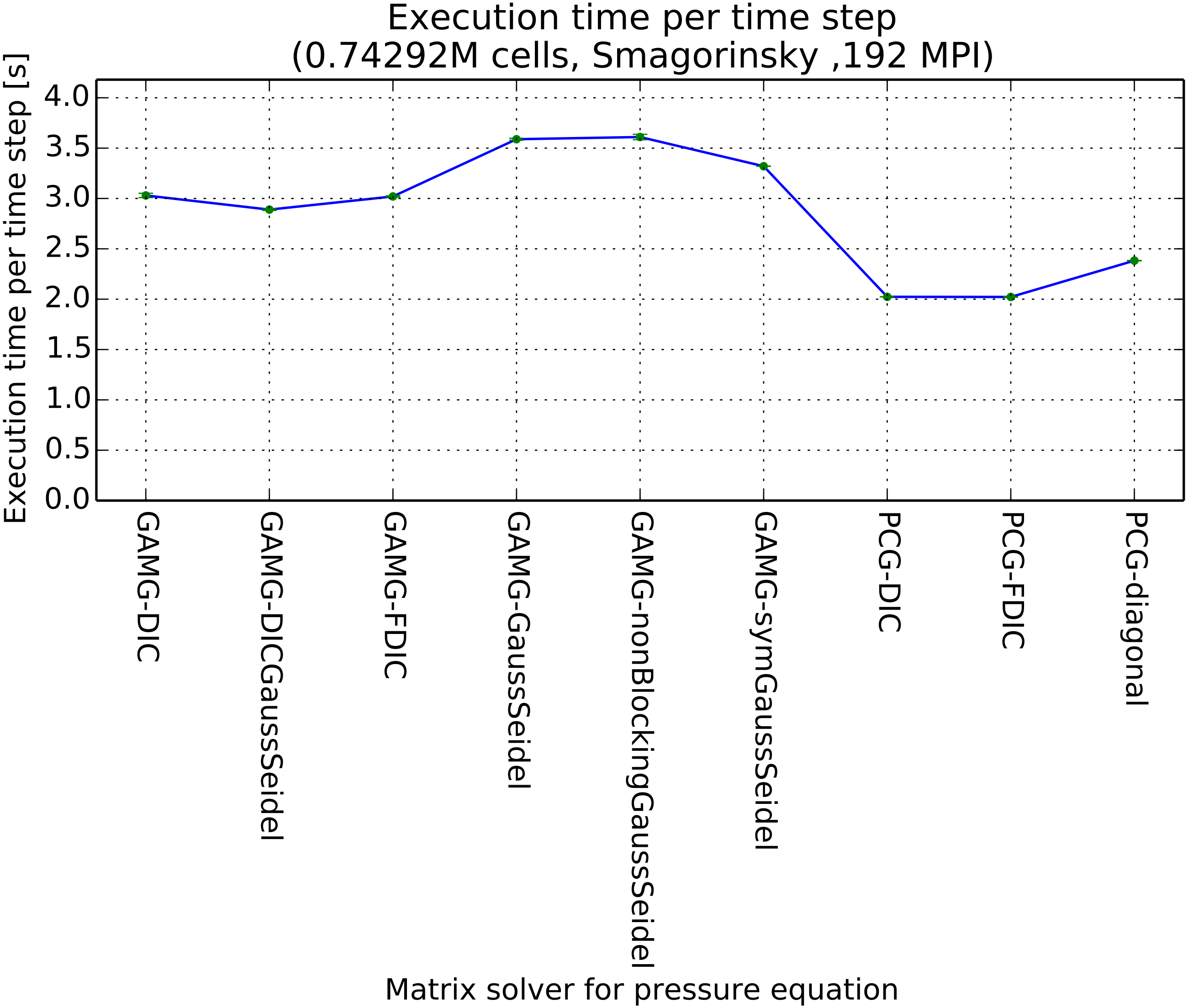

Execution time per time step
(0.74292M cells, Smagorinsky ,16 MPI)
Execution time per time step [s]
0
1
2
3
4
5
6
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation



Execution time per time step
(0.74292M cells, Smagorinsky ,32 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation


Execution time per time step
(0.74292M cells, Smagorinsky ,64 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation


Execution time per time step
(0.74292M cells, Smagorinsky ,128 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation


Execution time per time step
(0.74292M cells, Smagorinsky ,192 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
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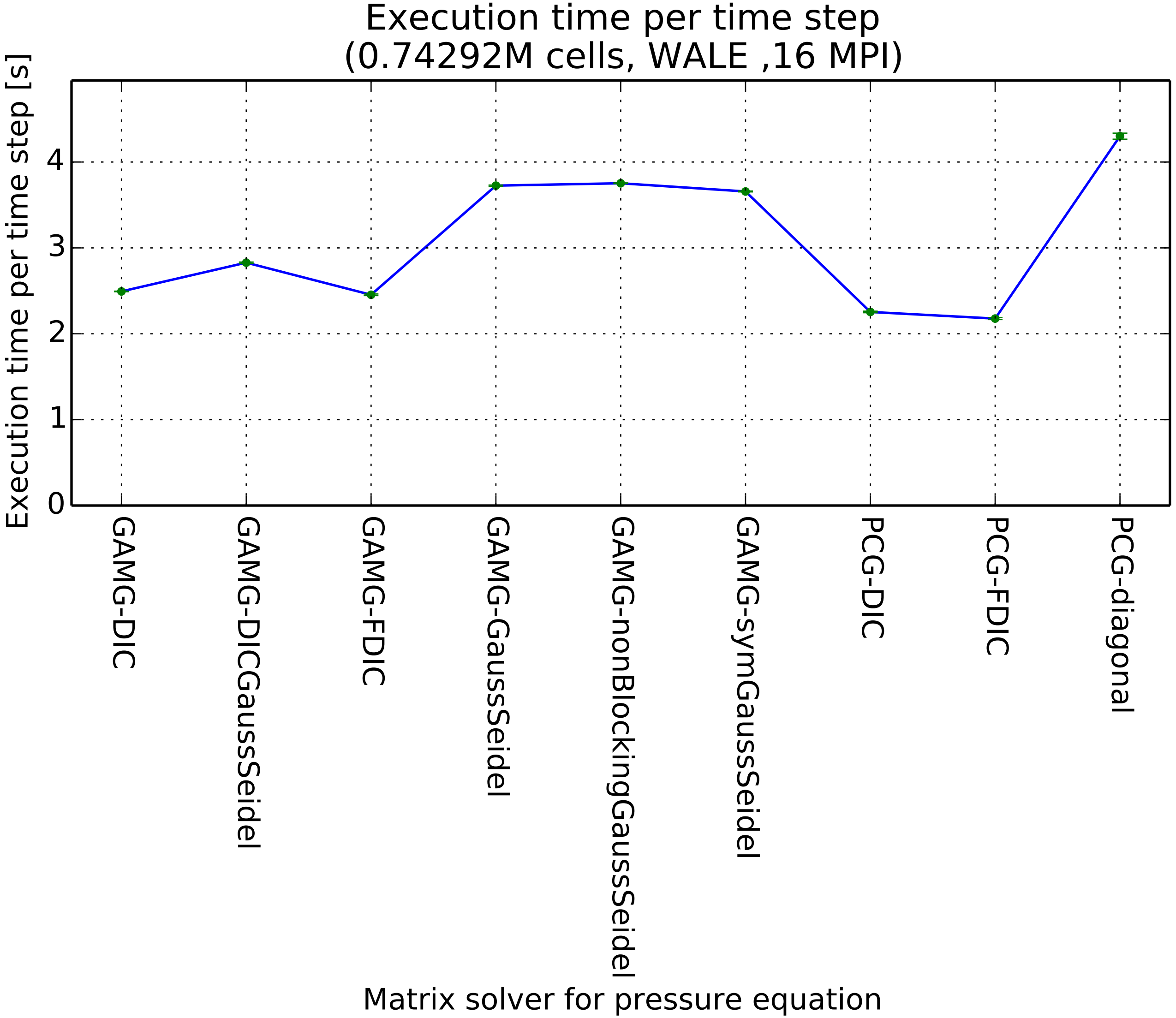
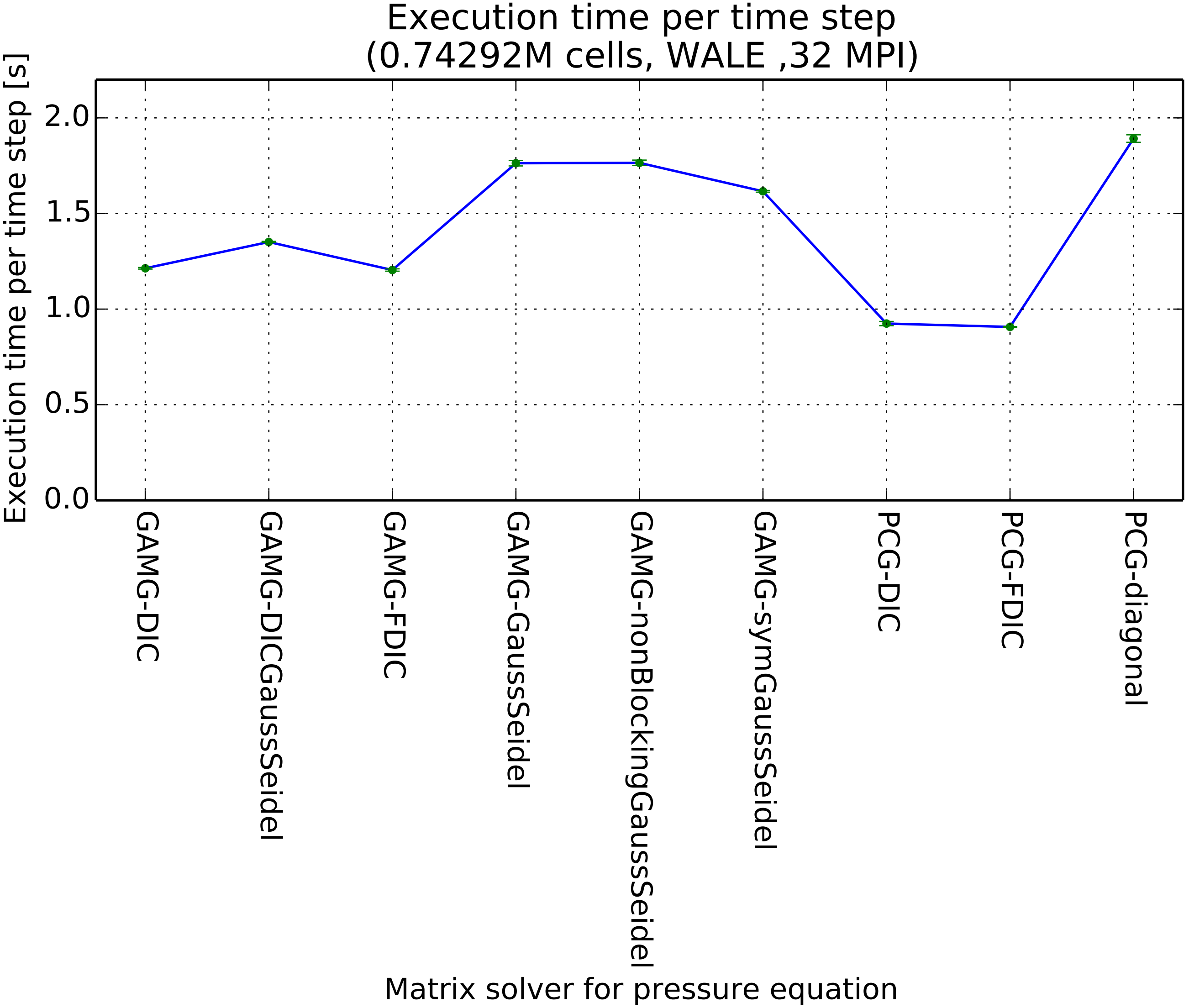
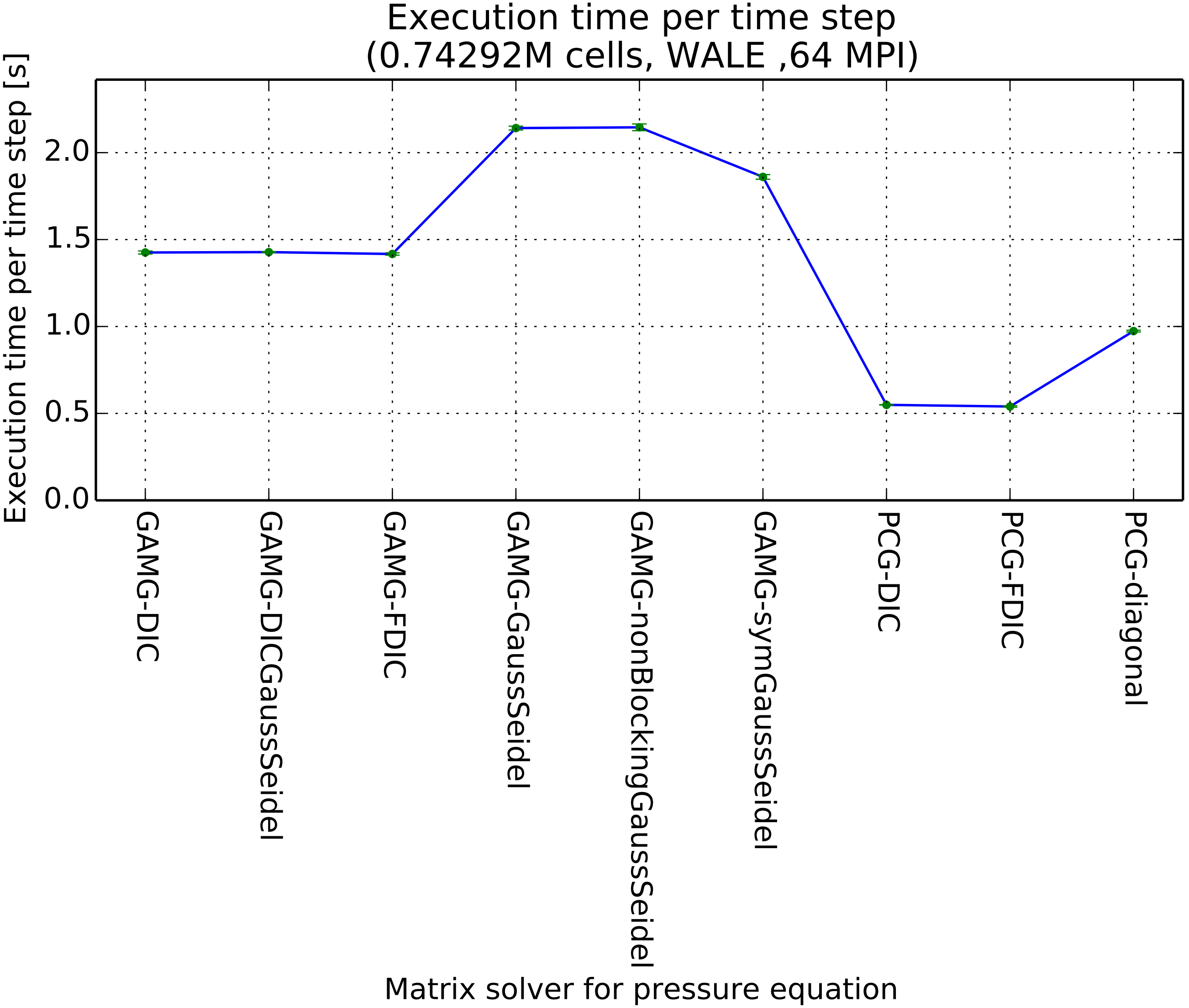
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

Execution time per time step
(0.74292M cells, WALE ,16 MPI)
Execution time per time step [s]
0
1
2
3
4
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation


Execution time per time step
(0.74292M cells, WALE ,32 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

Execution time per time step
(0.74292M cells, WALE ,64 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
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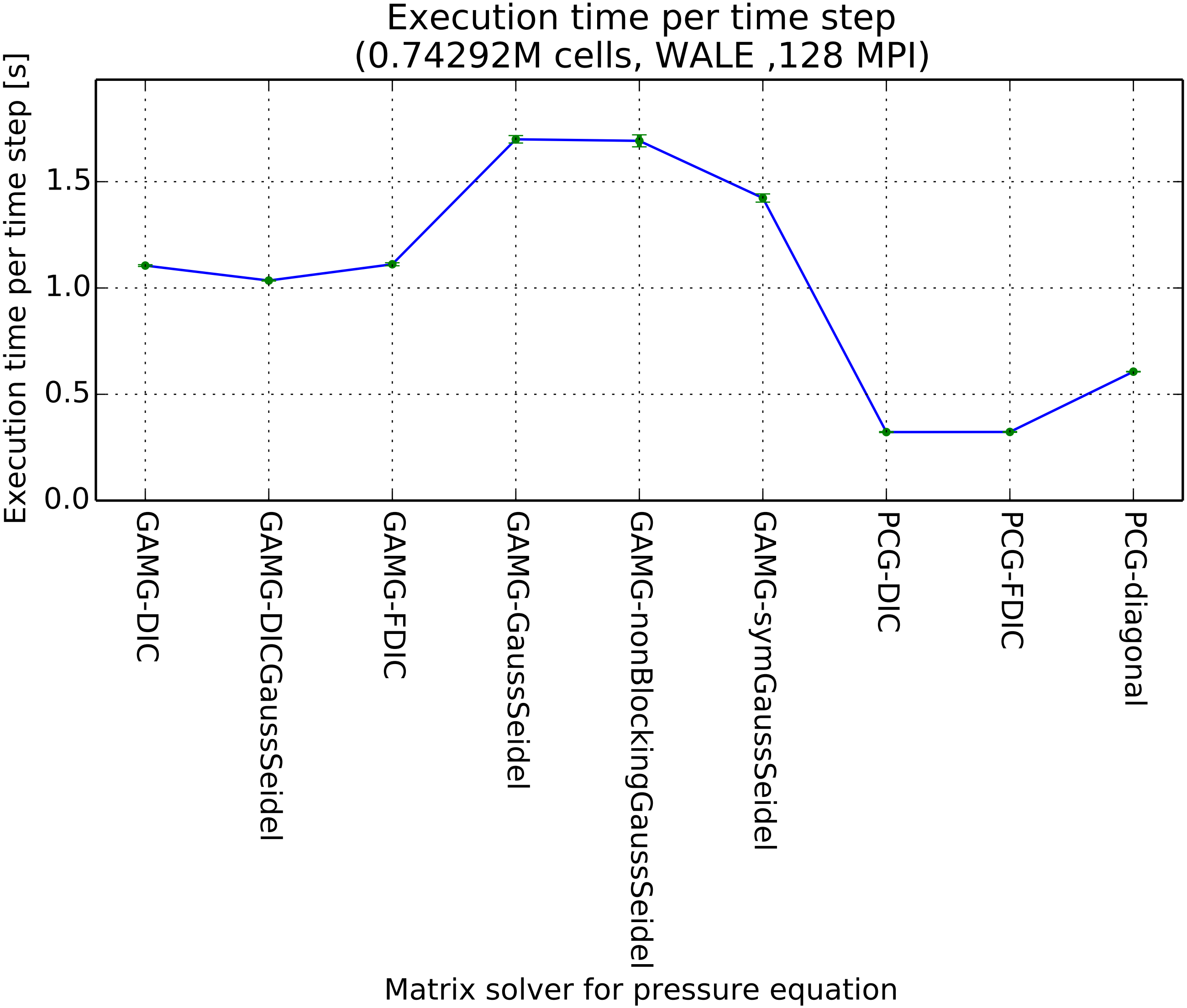
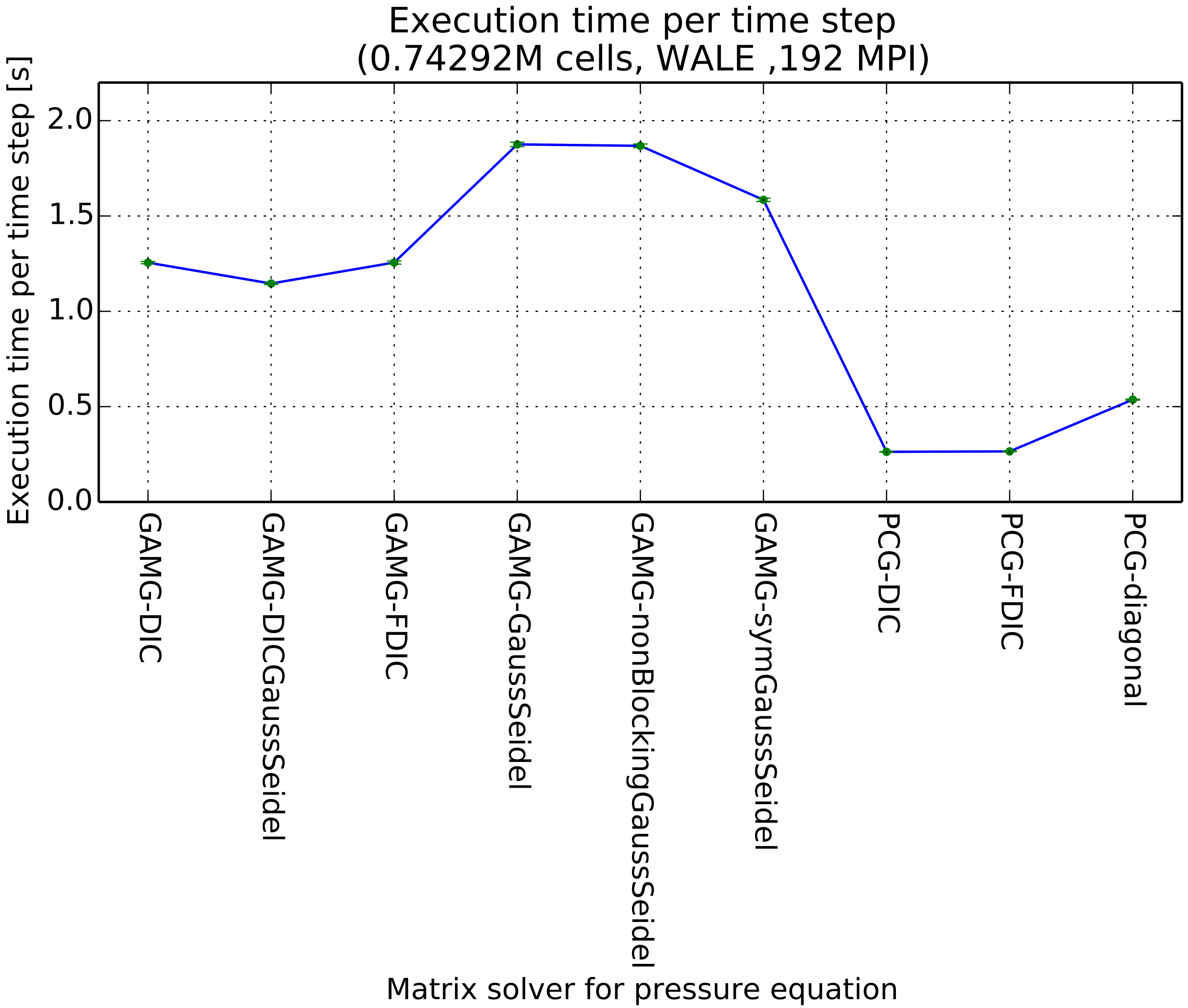
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation



Execution time per time step
(0.74292M cells, WALE ,128 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation


Execution time per time step
(0.74292M cells, WALE ,192 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
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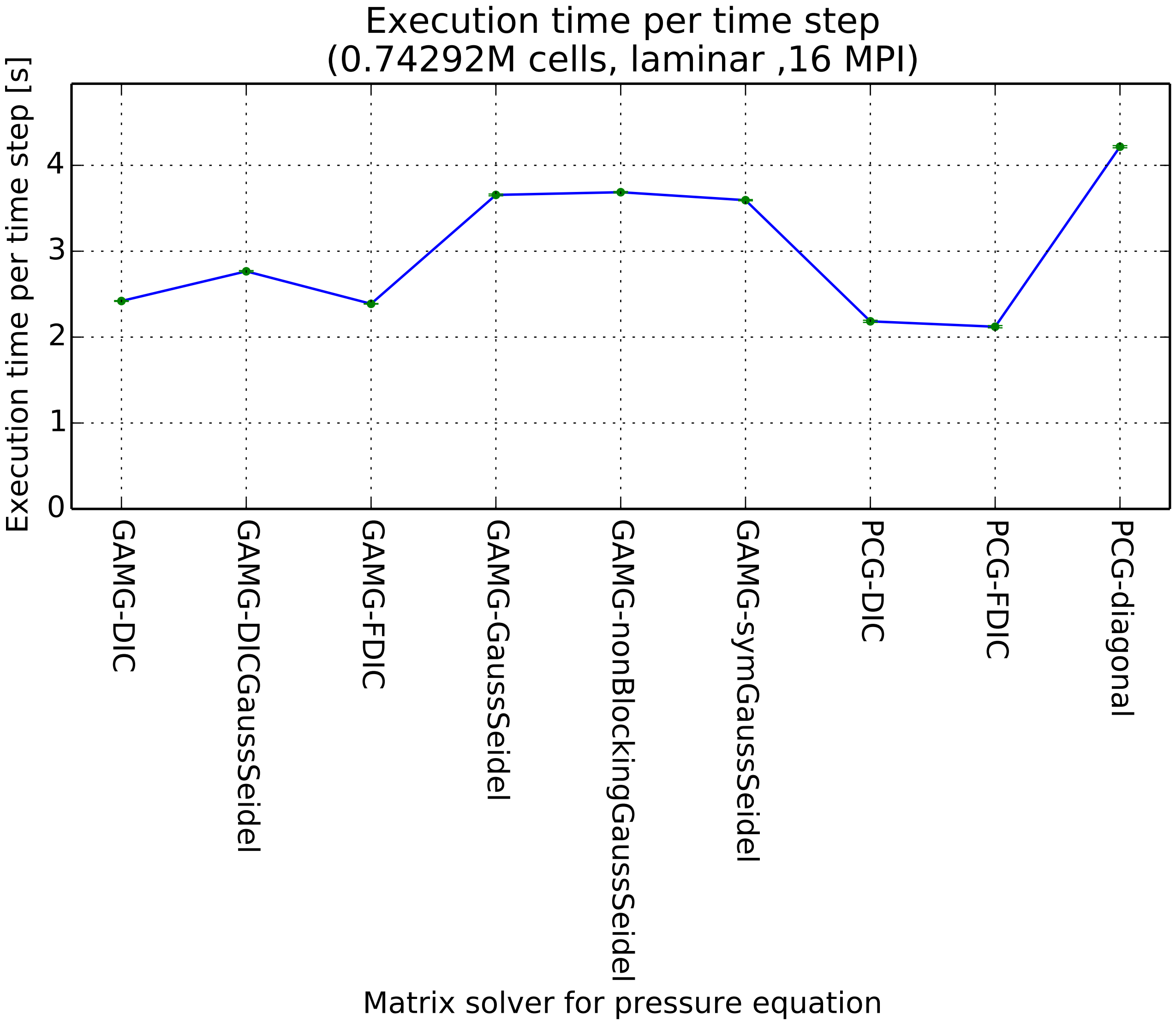
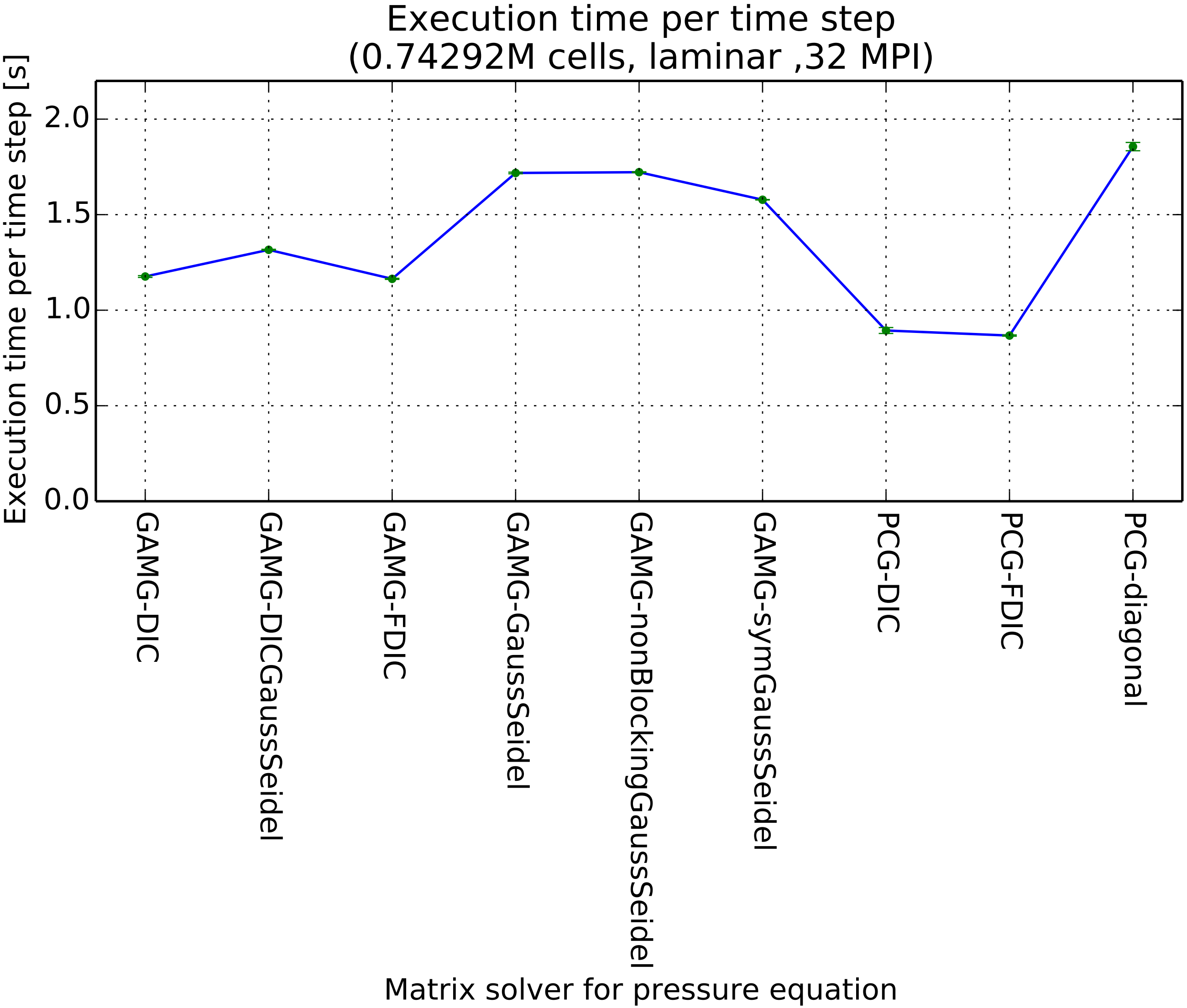
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

Execution time per time step
(0.74292M cells, laminar ,16 MPI)
Execution time per time step [s]
0
1
2
3
4
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation


Execution time per time step
(0.74292M cells, laminar ,32 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
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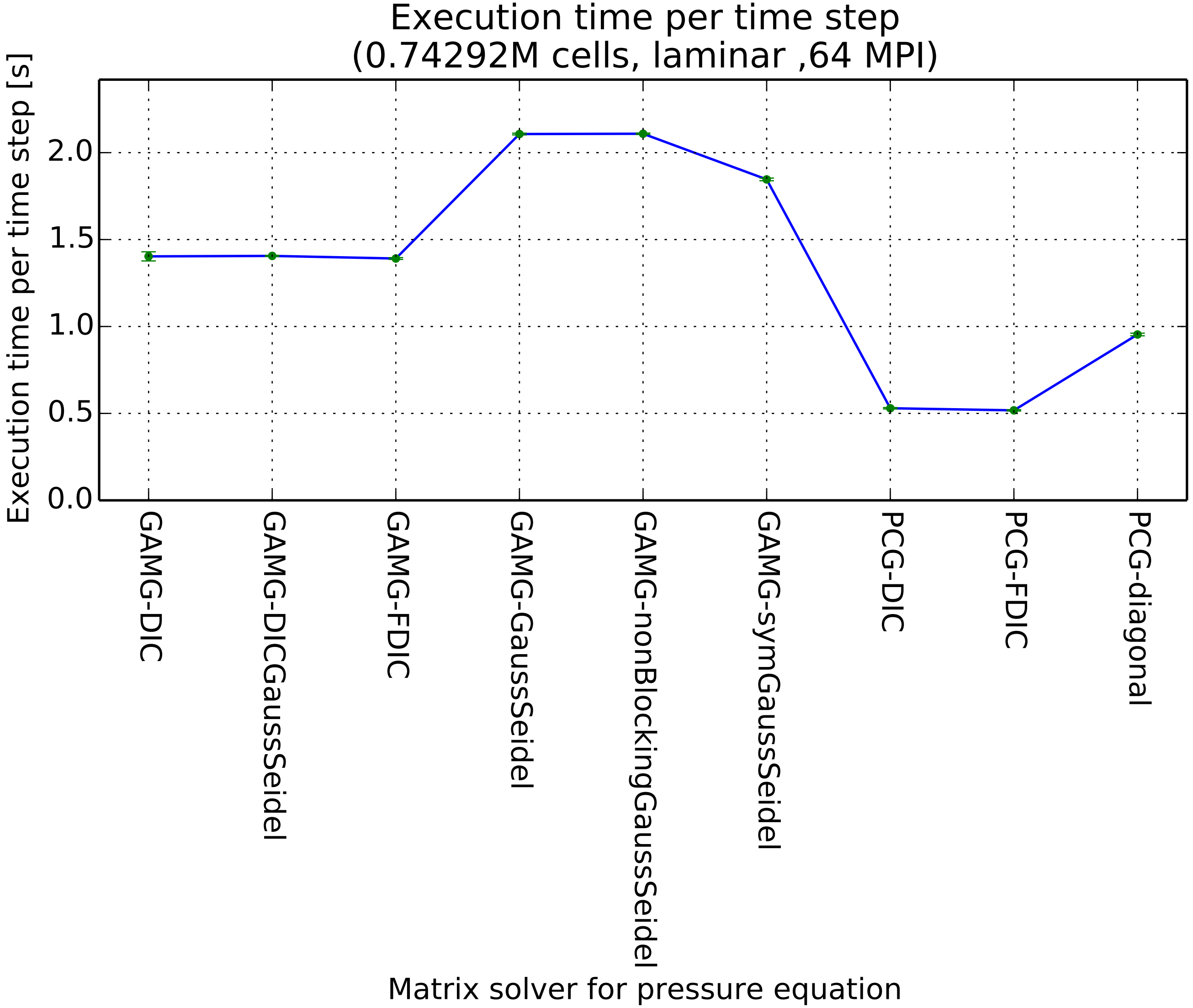
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation


Execution time per time step
(0.74292M cells, laminar ,64 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
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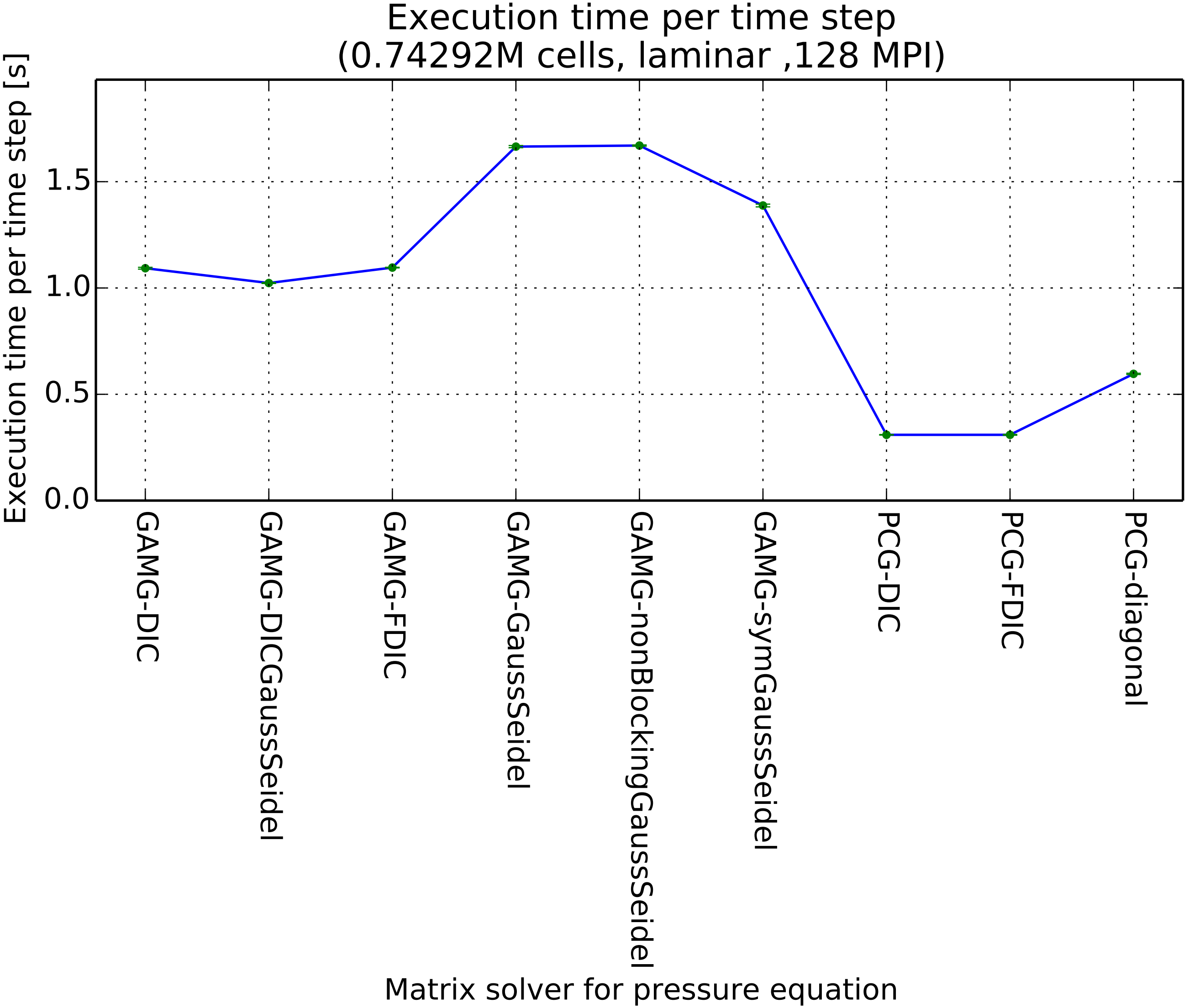
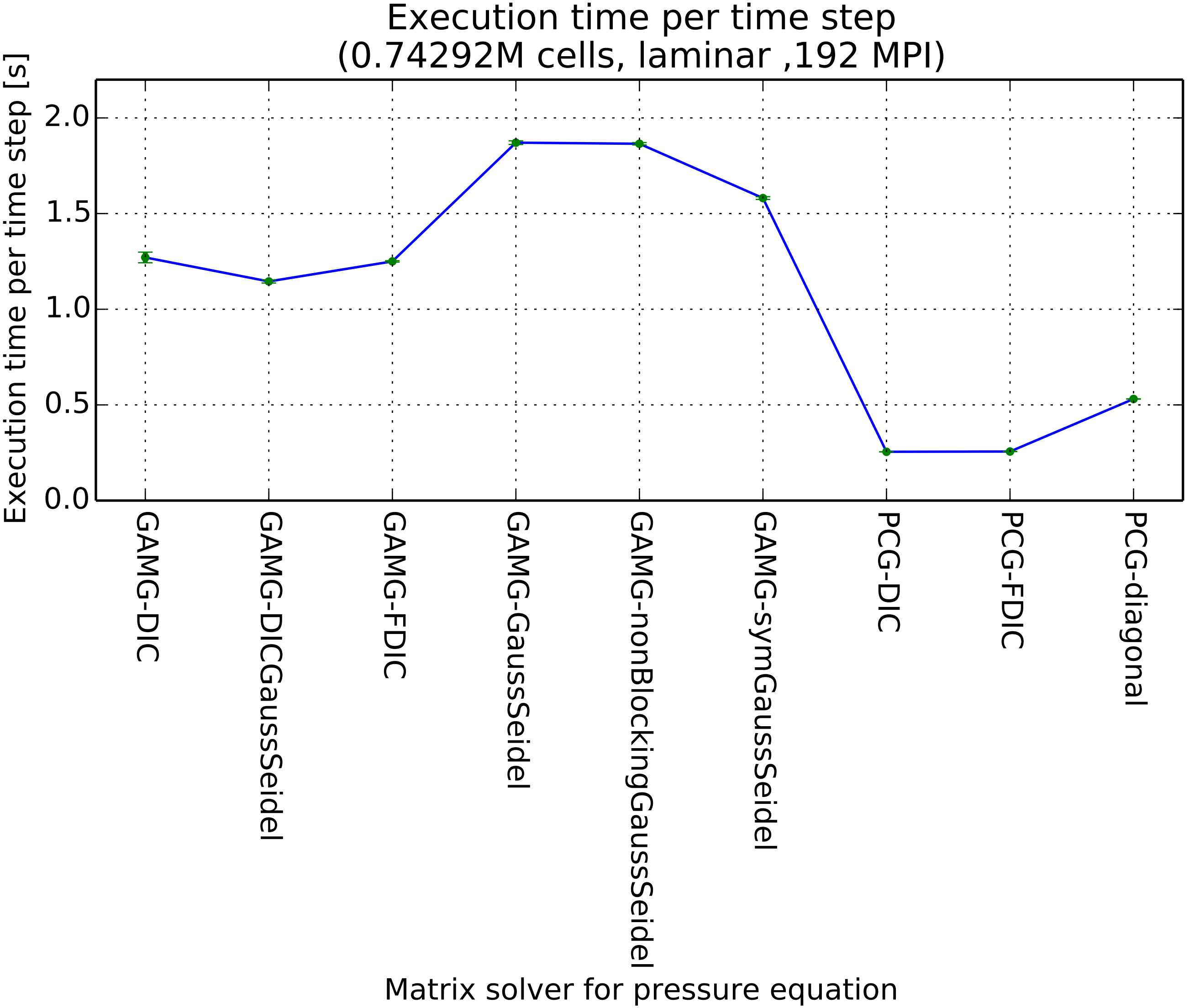
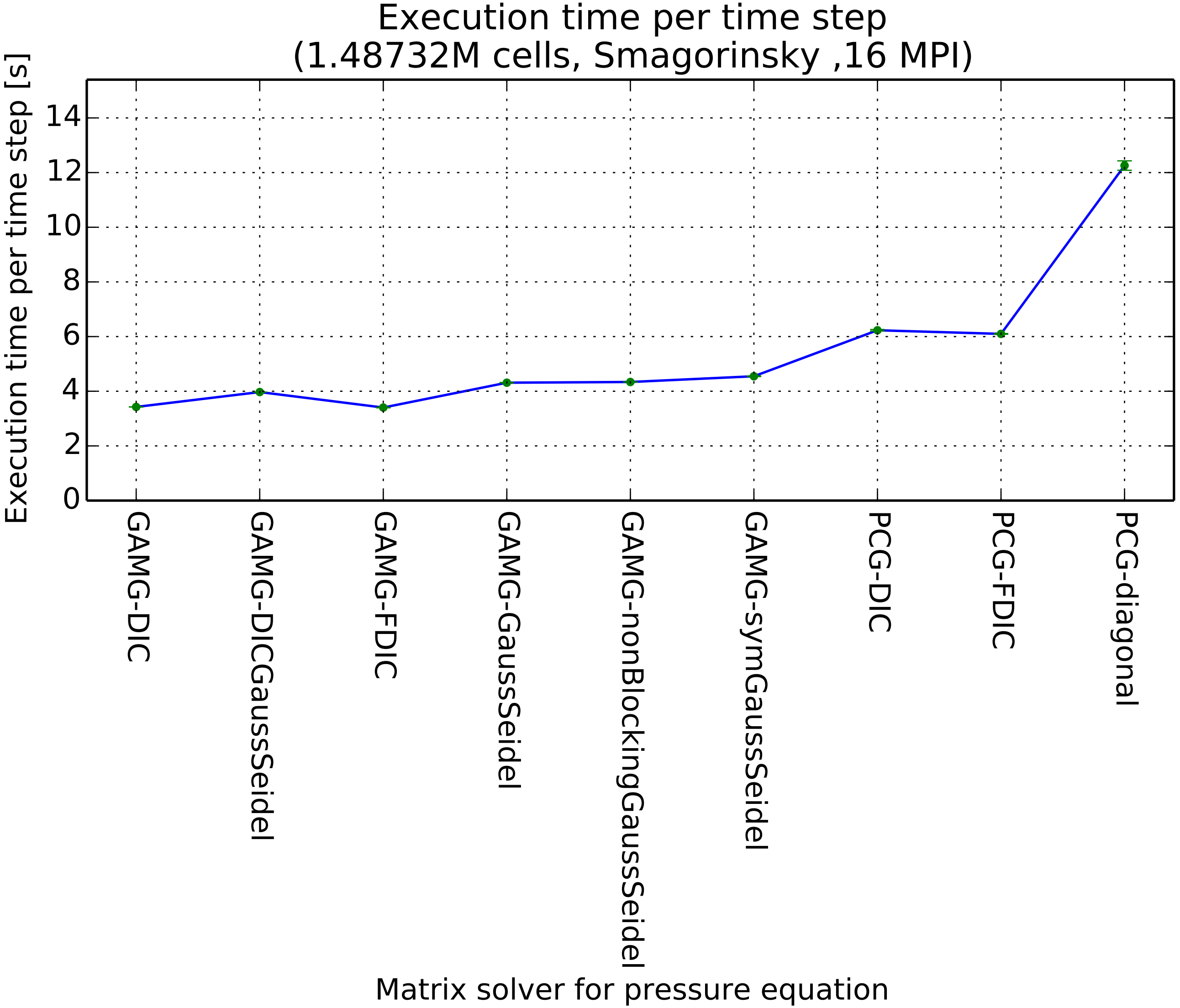
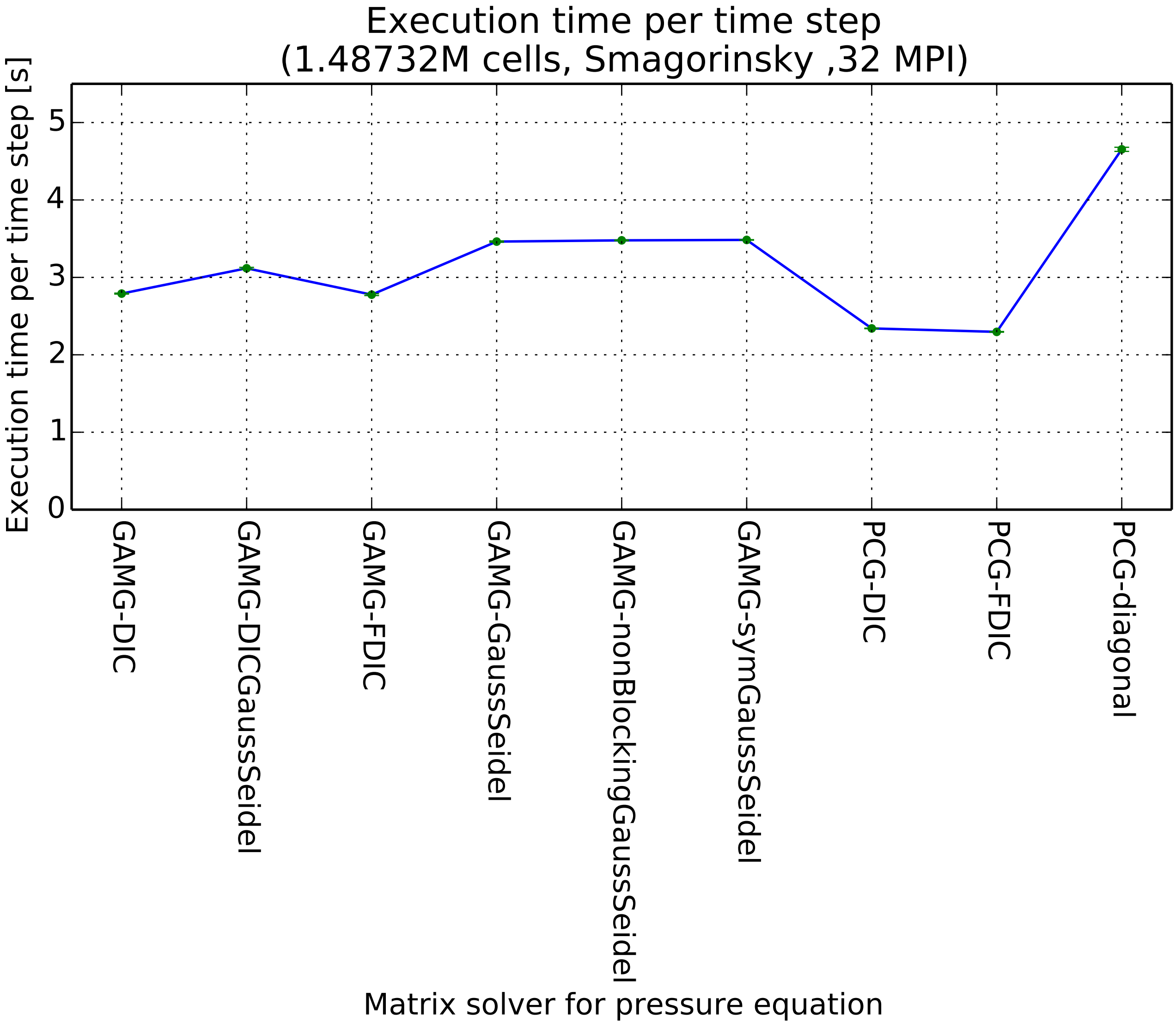
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

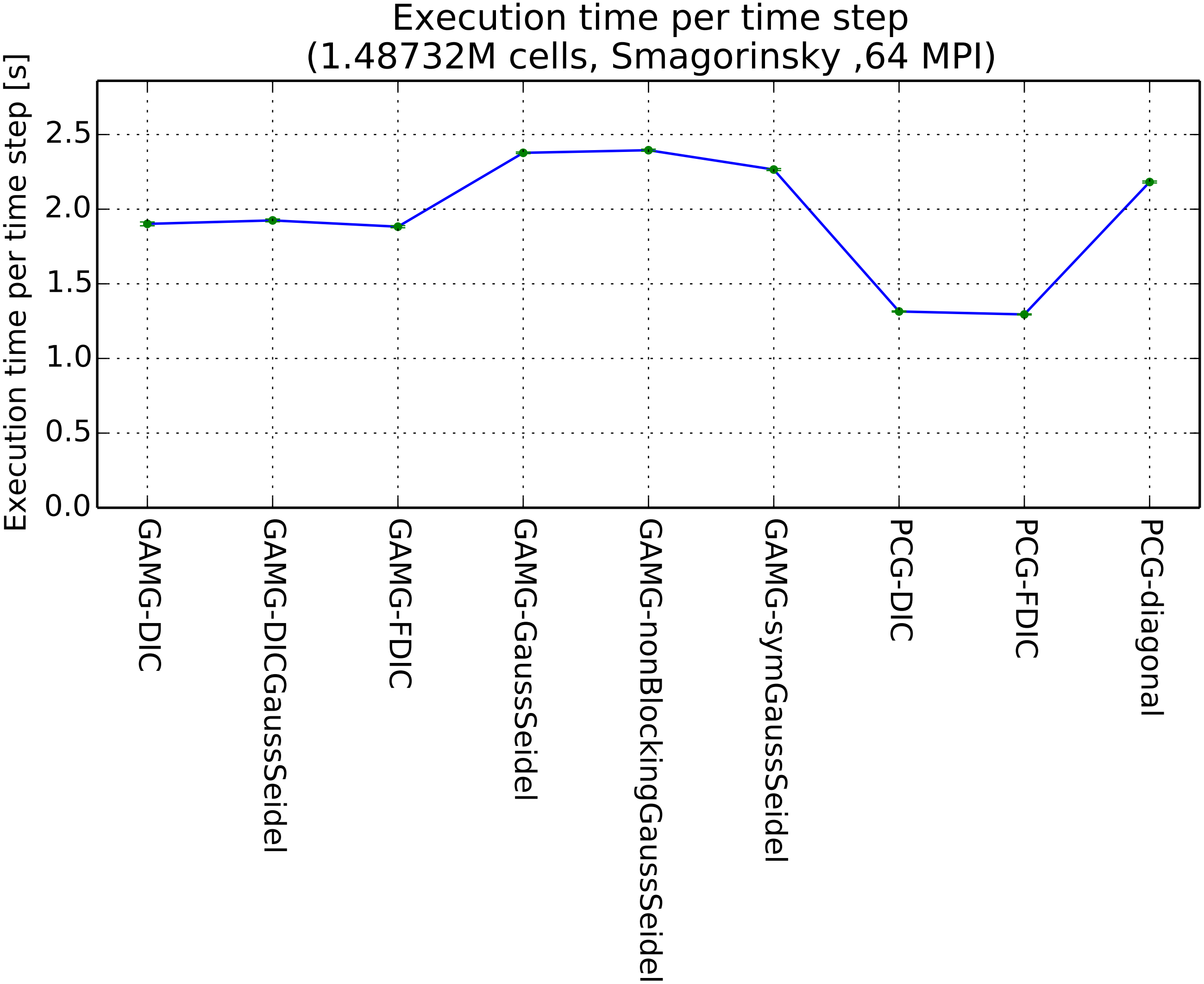

Execution time per time step
(0.74292M cells, laminar ,128 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

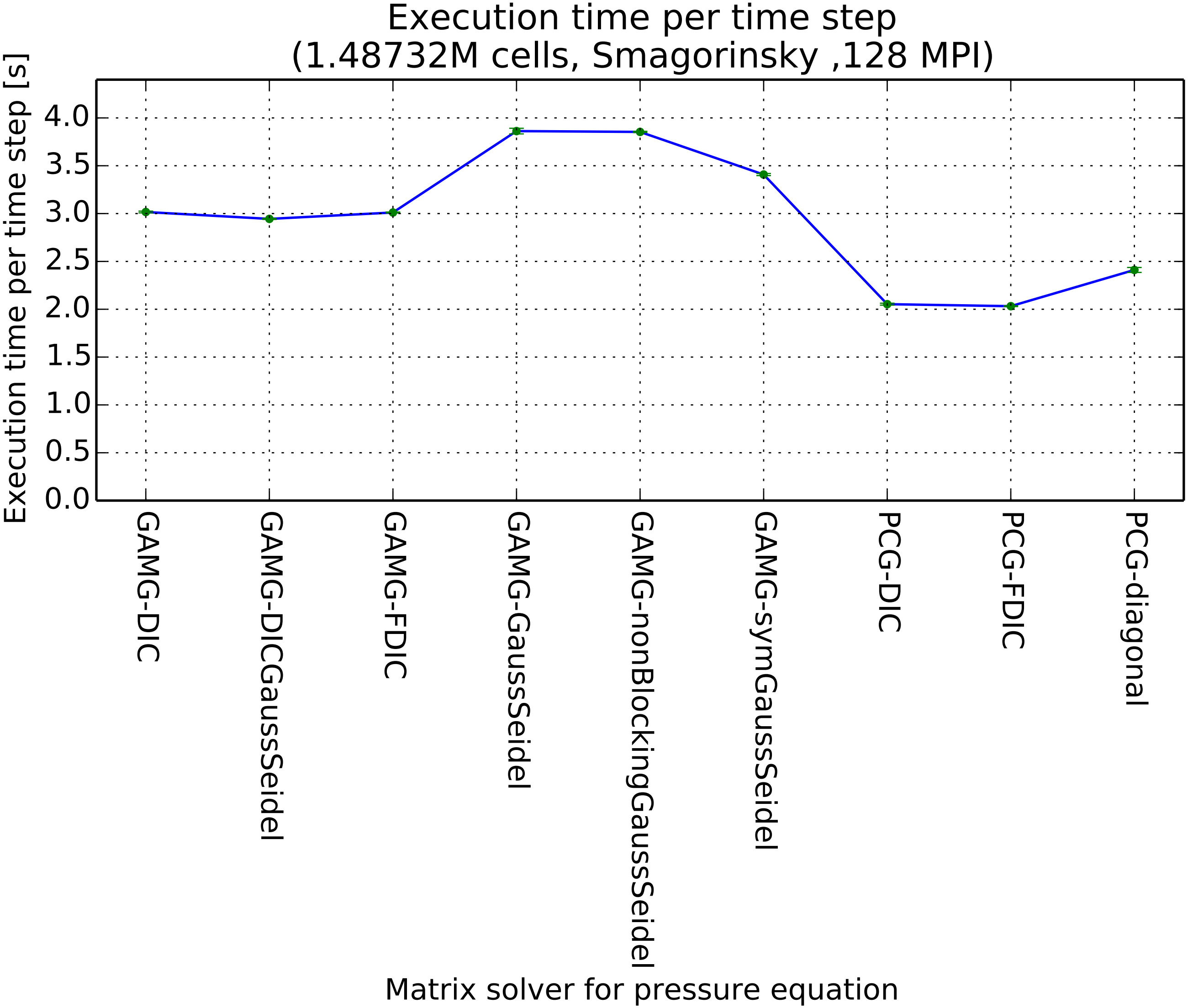


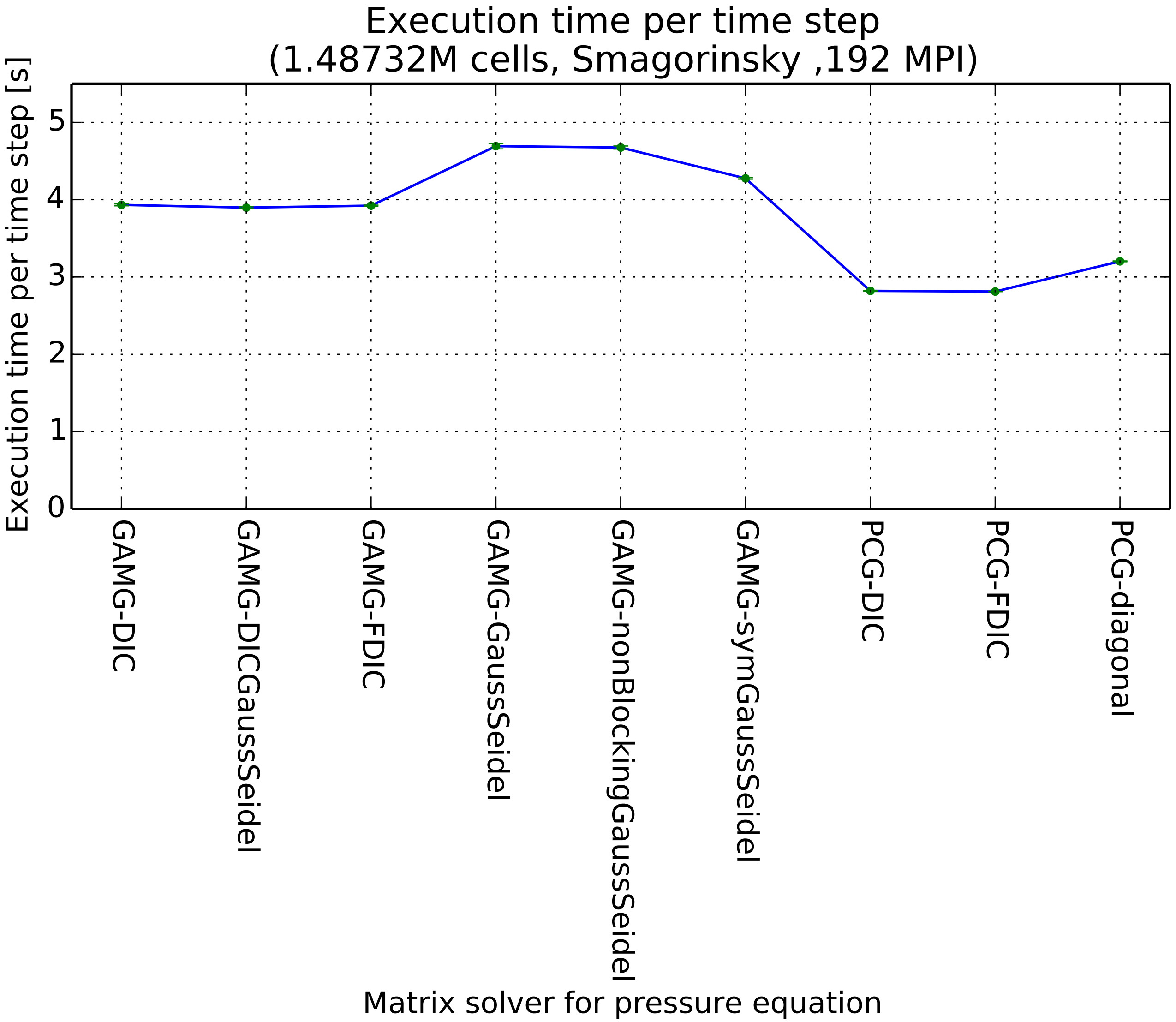
Execution time per time step
(0.74292M cells, laminar ,192 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

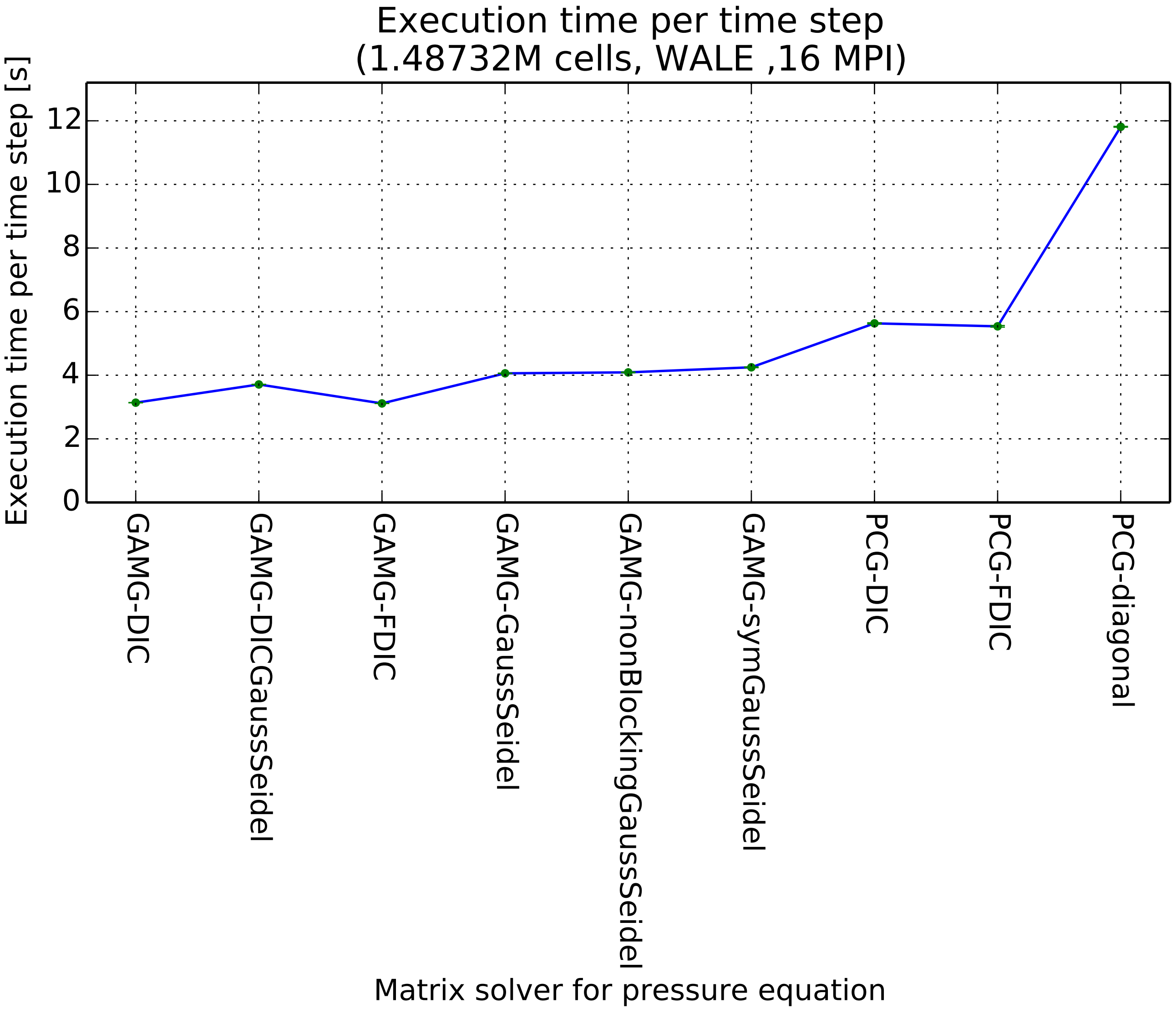

Execution time per time step
(1.48732M cells, Smagorinsky ,16 MPI)
Execution time per time step [s]
0
2
4
6
8
10
12
14
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

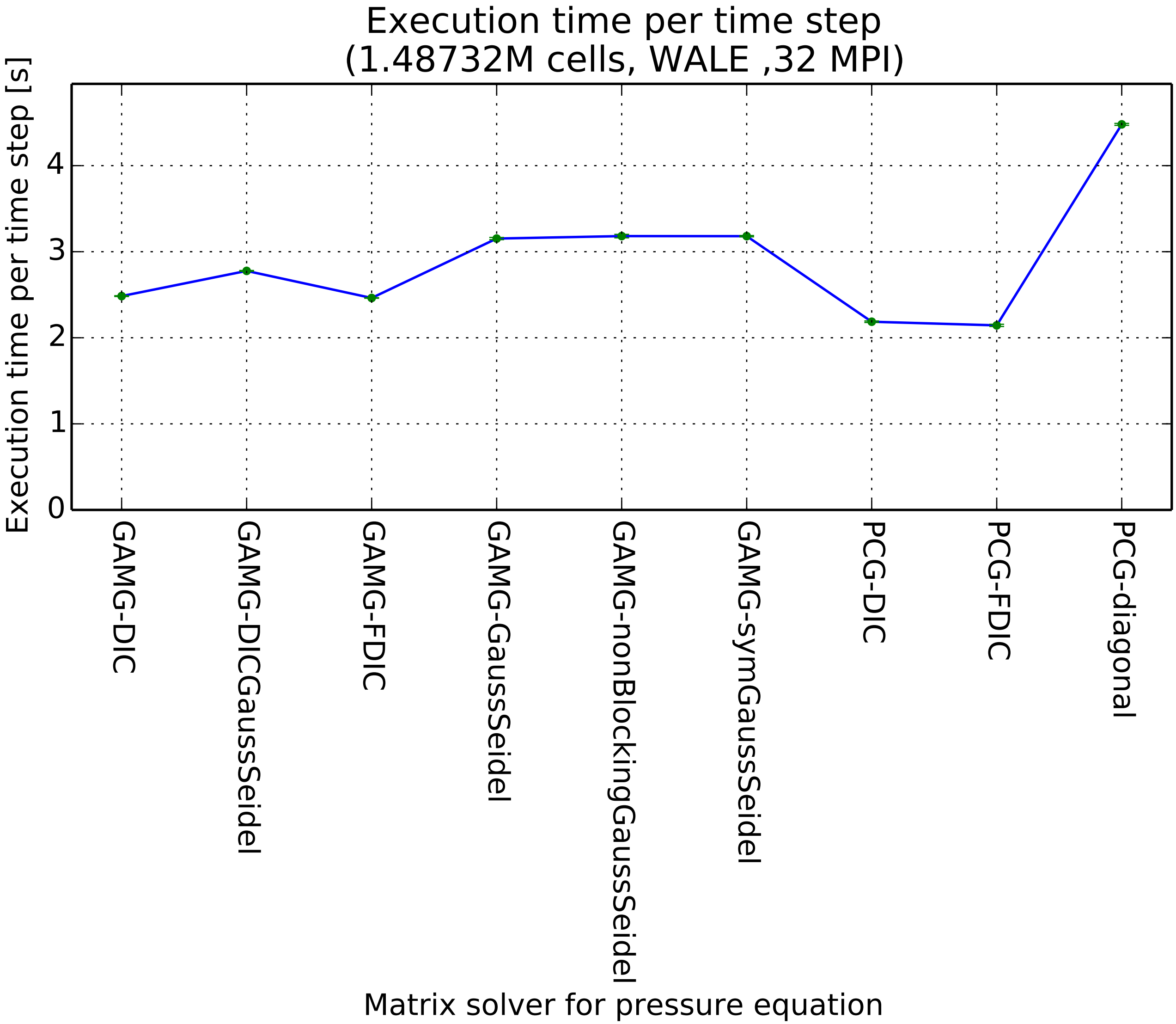

Execution time per time step
(1.48732M cells, Smagorinsky ,32 MPI)
Execution time per time step [s]
0
1
2
3
4
5
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

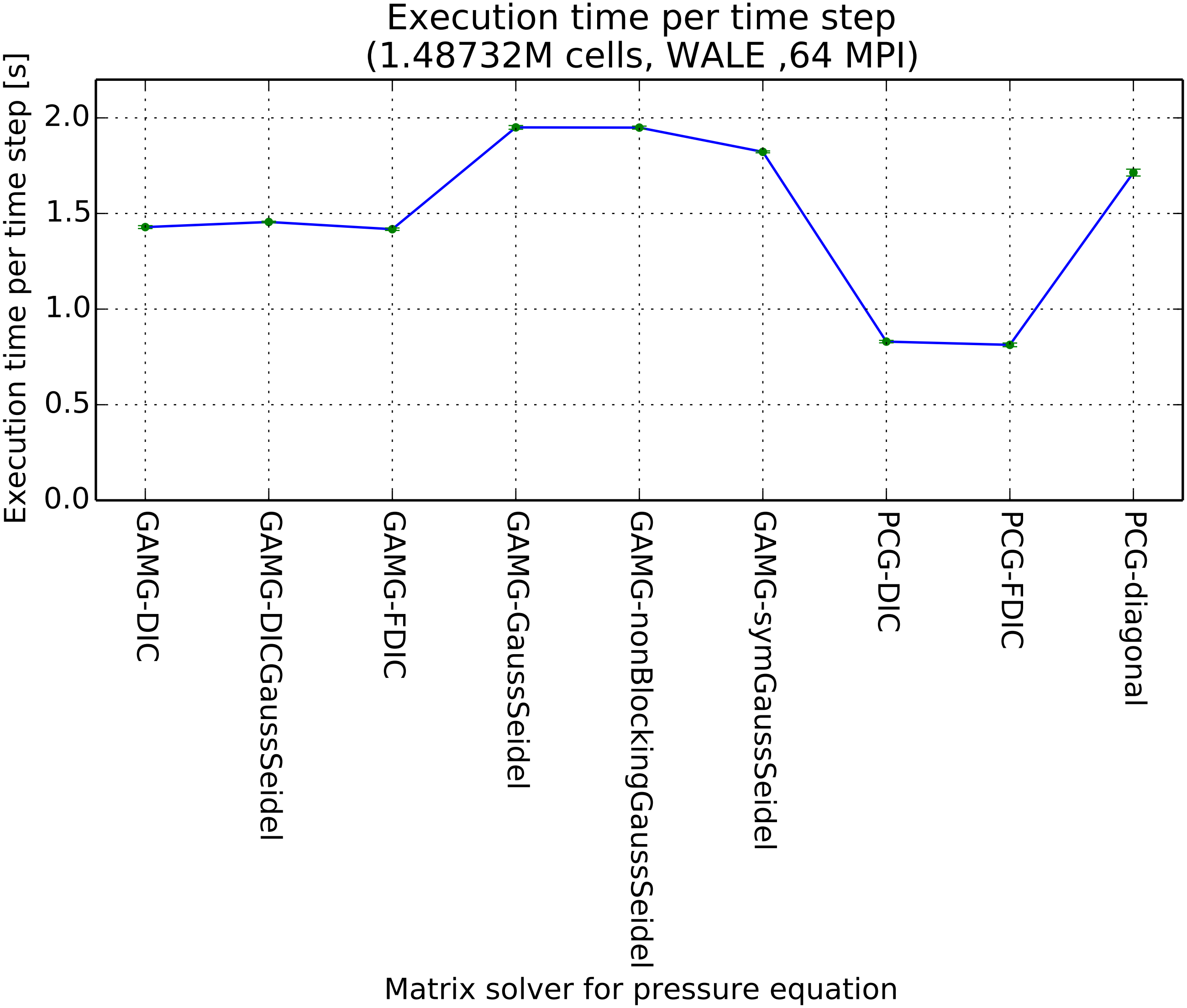

Execution time per time step
(1.48732M cells, Smagorinsky ,64 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

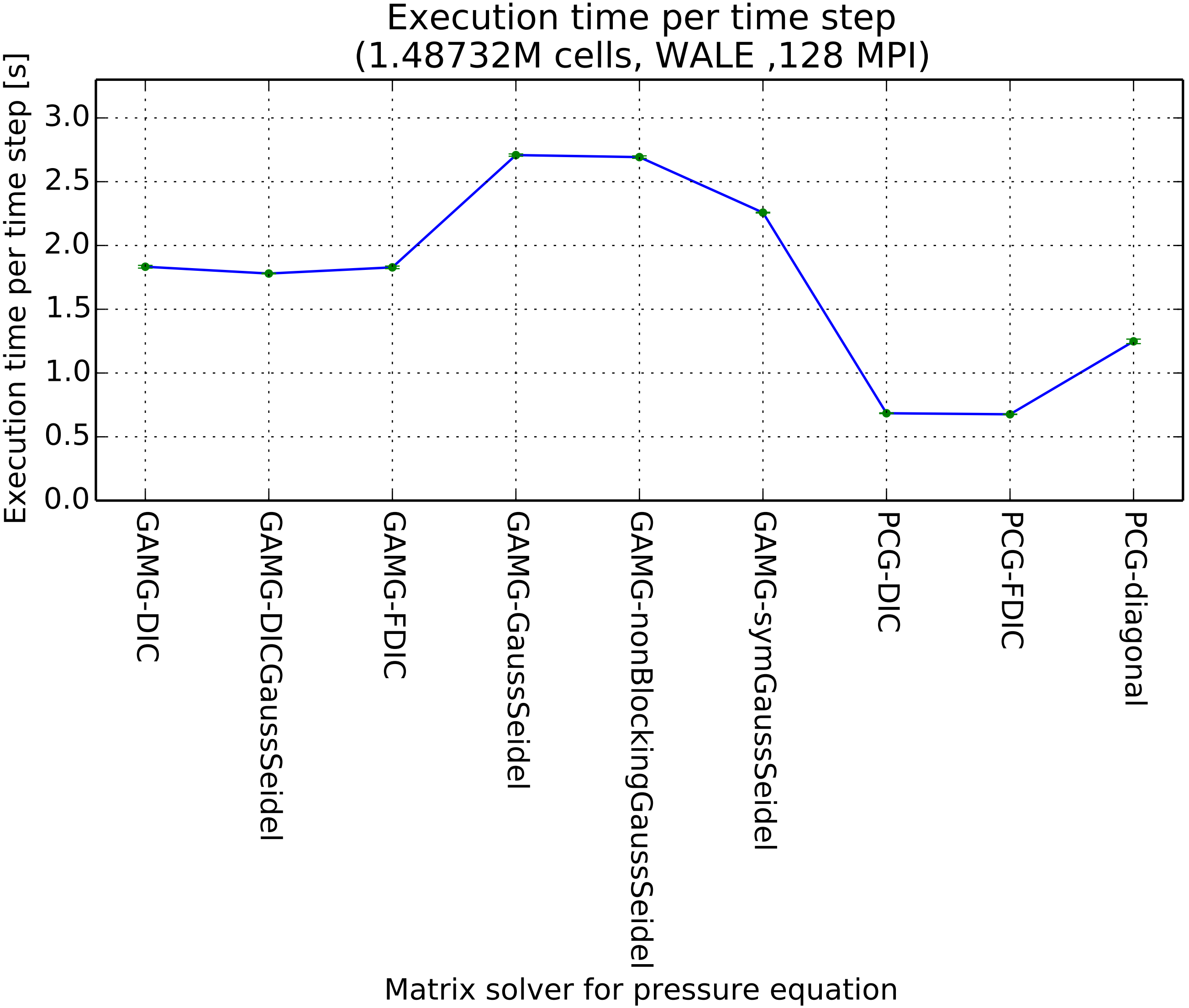

Execution time per time step
(1.48732M cells, Smagorinsky ,128 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

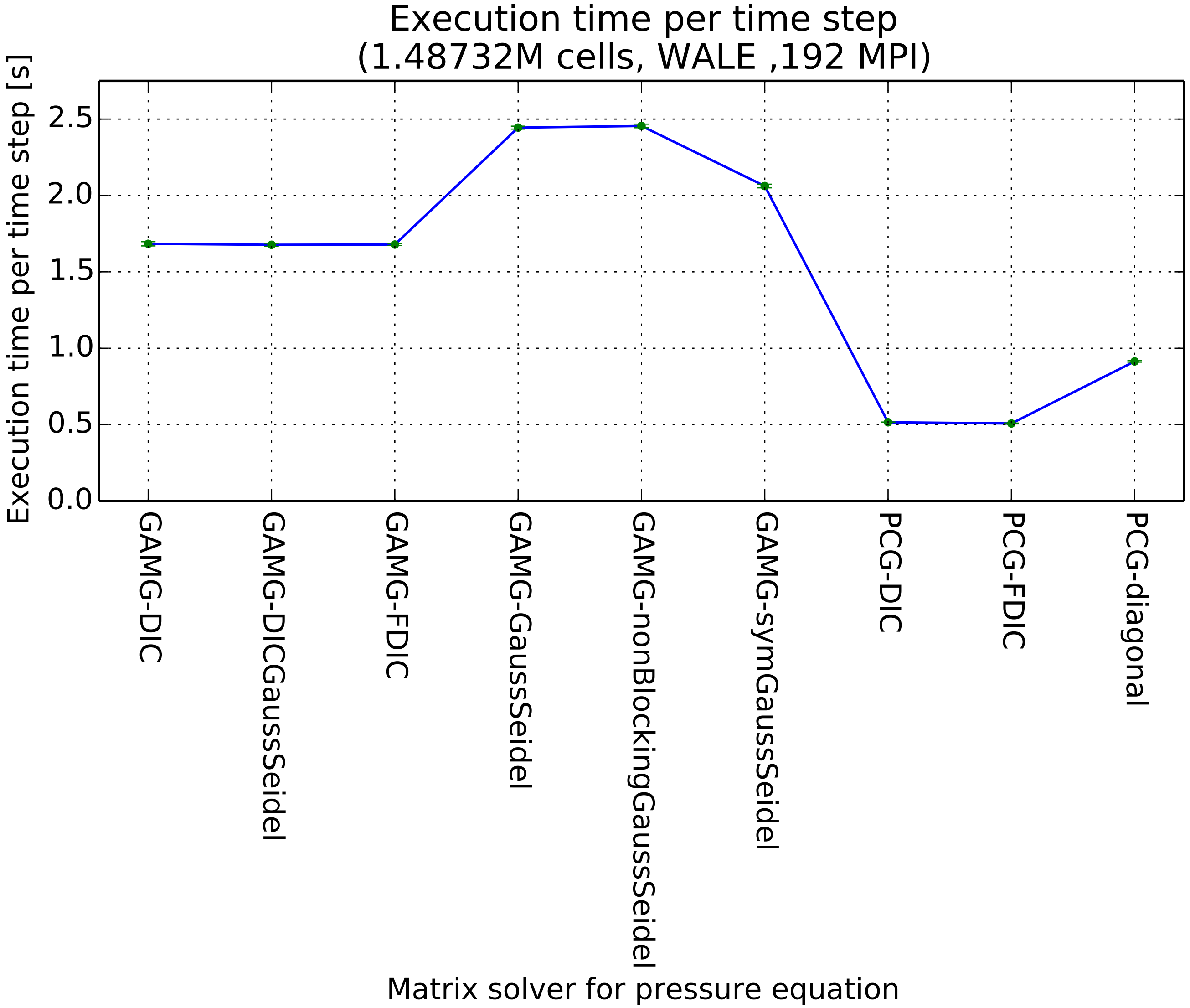
Execution time per time step
(1.48732M cells, Smagorinsky ,192 MPI)
Execution time per time step [s]
0
1
2
3
4
5
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

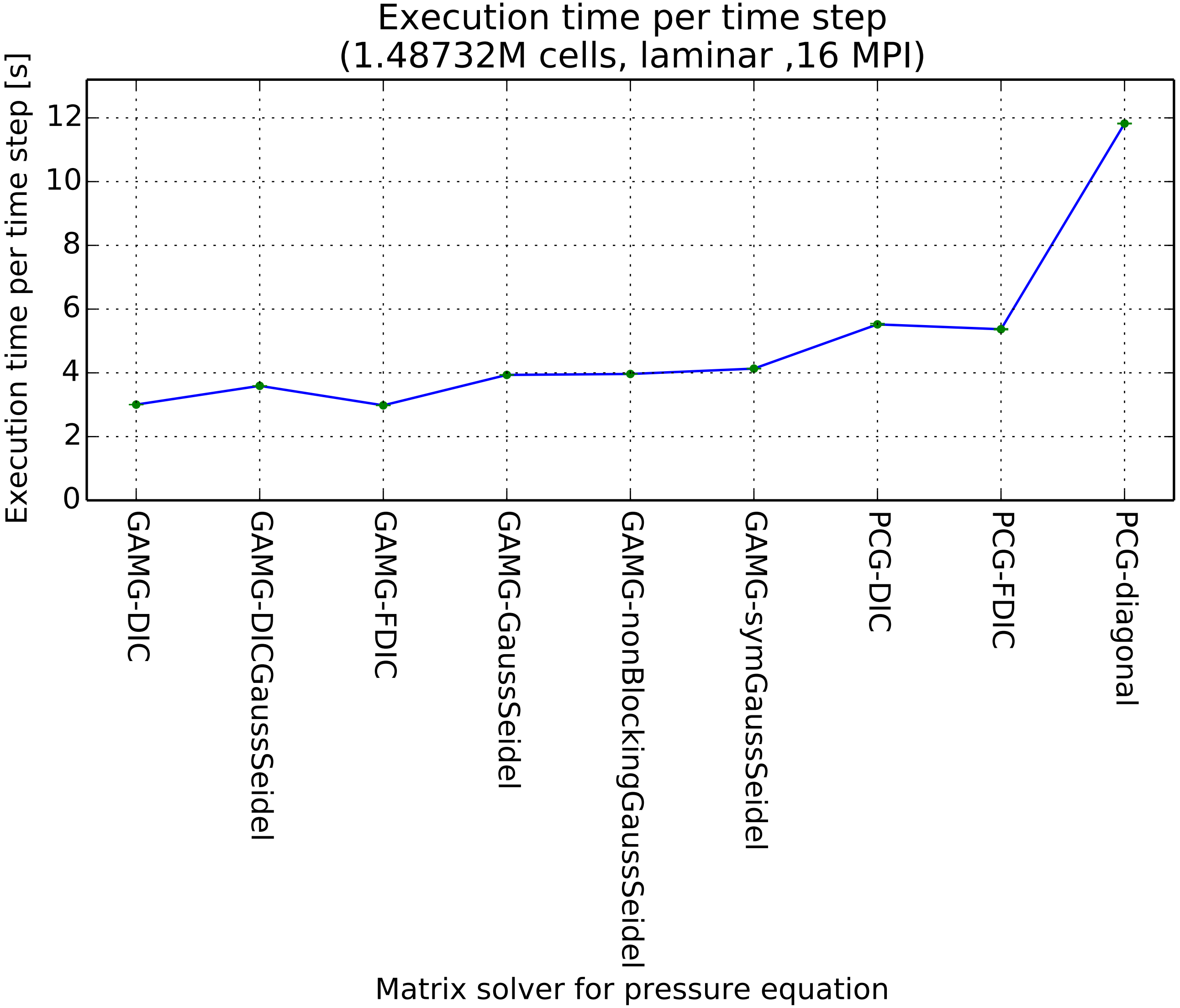

Execution time per time step
(1.48732M cells, WALE ,16 MPI)
Execution time per time step [s]
0
2
4
6
8
10
12
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

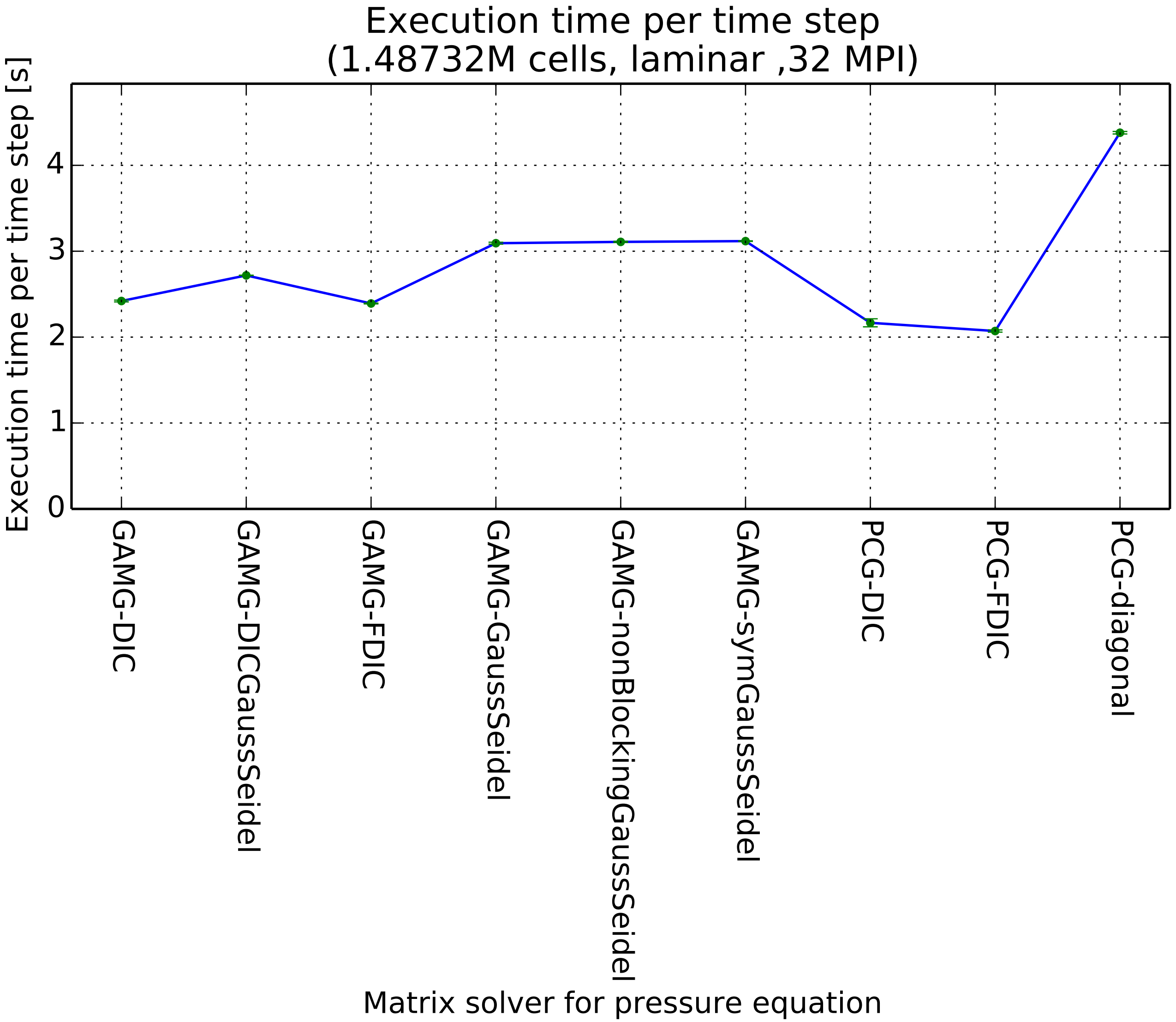
Execution time per time step
(1.48732M cells, WALE ,32 MPI)
Execution time per time step [s]
0
1
2
3
4
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

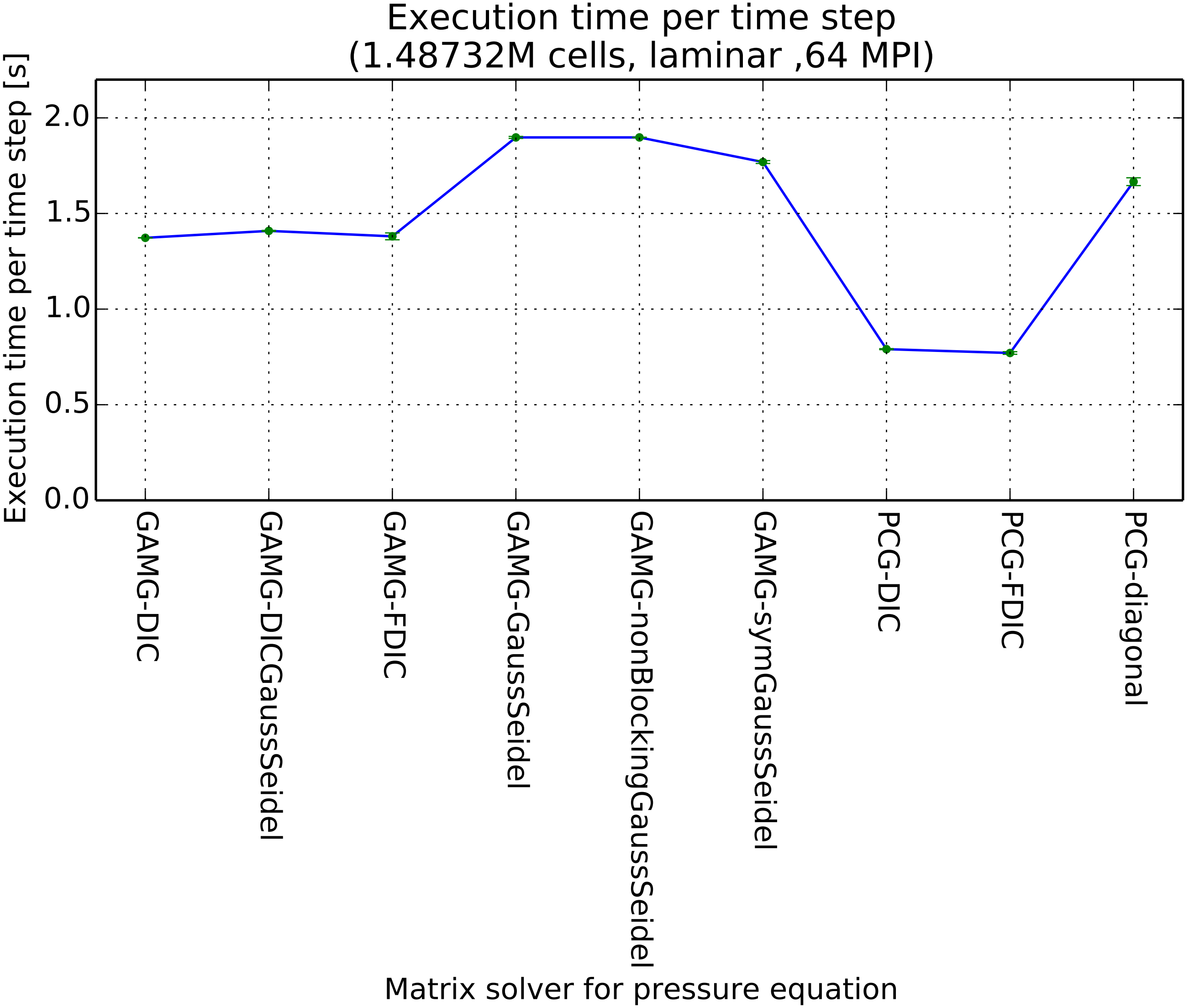

Execution time per time step
(1.48732M cells, WALE ,64 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

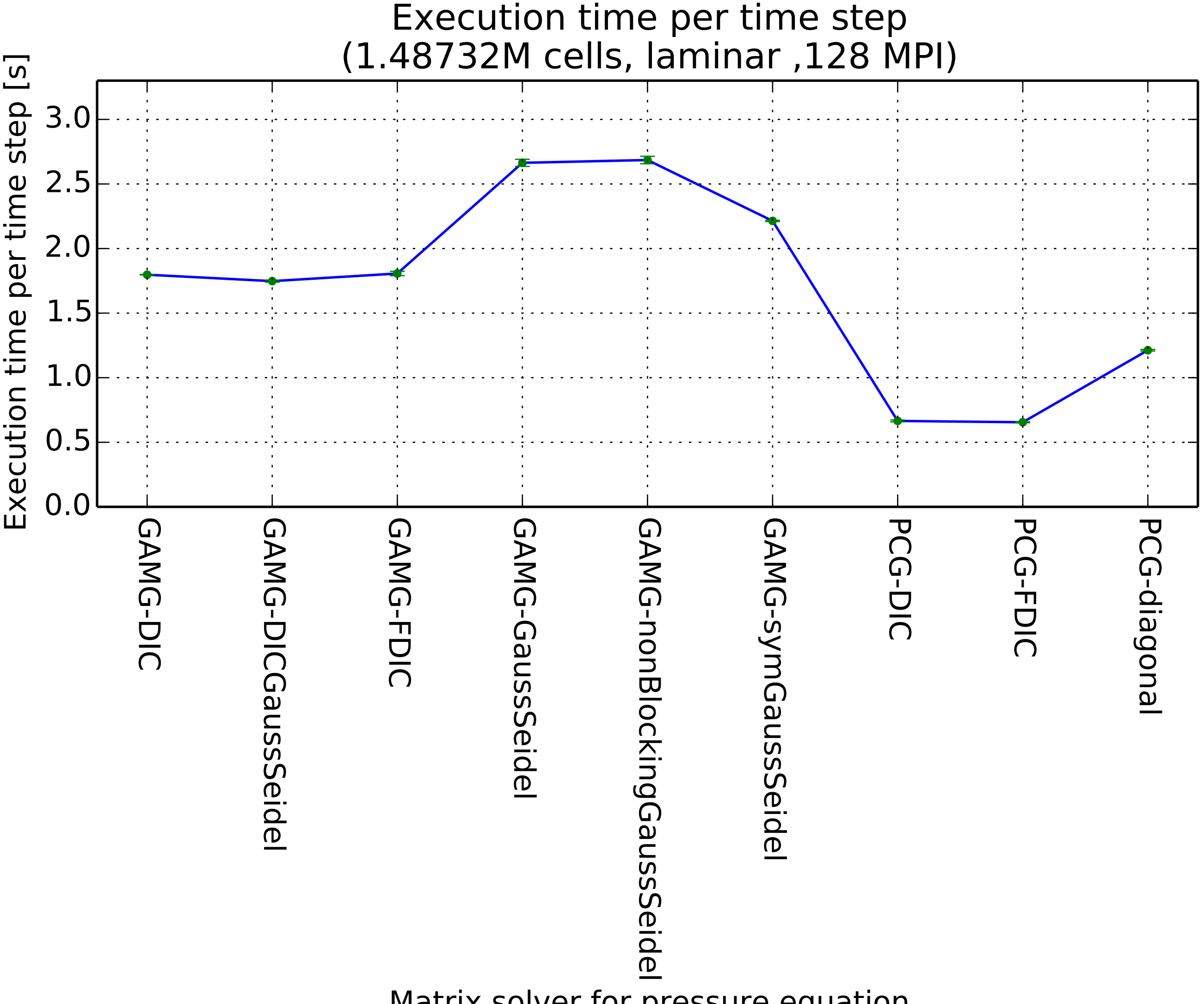

Execution time per time step
(1.48732M cells, WALE ,128 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

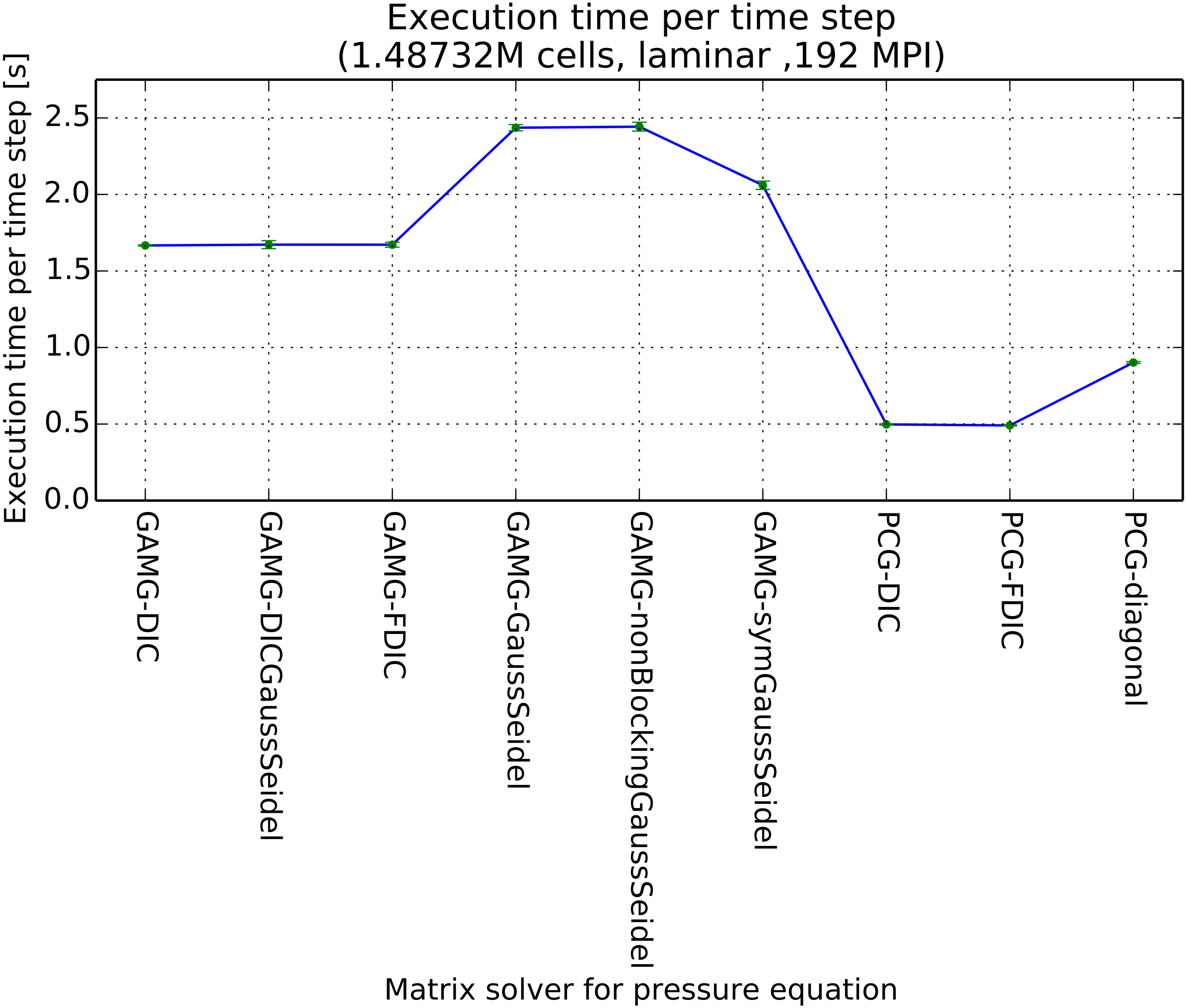
Execution time per time step
(1.48732M cells, WALE ,192 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

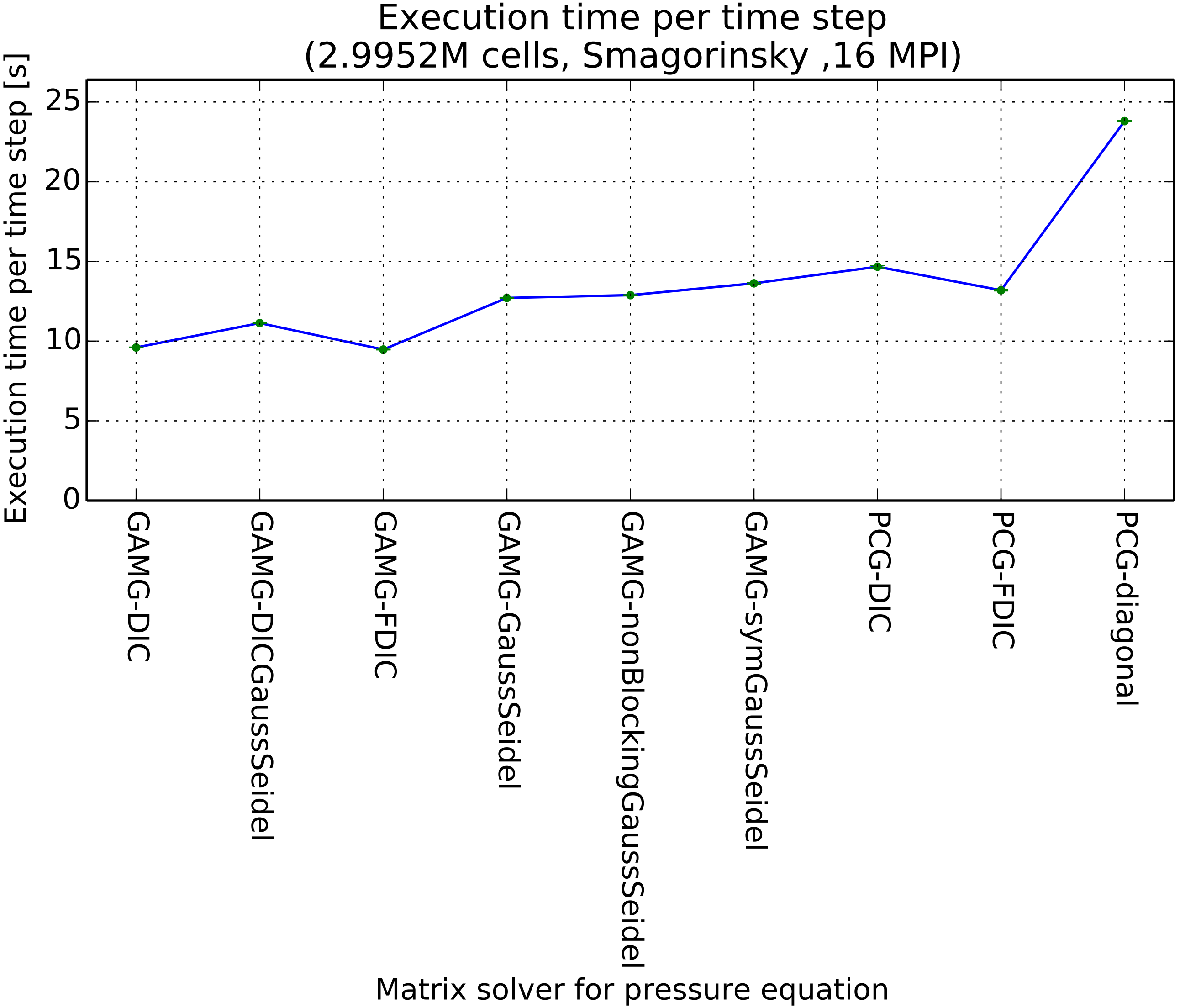

Execution time per time step
(1.48732M cells, laminar ,16 MPI)
Execution time per time step [s]
0
2
4
6
8
10
12
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

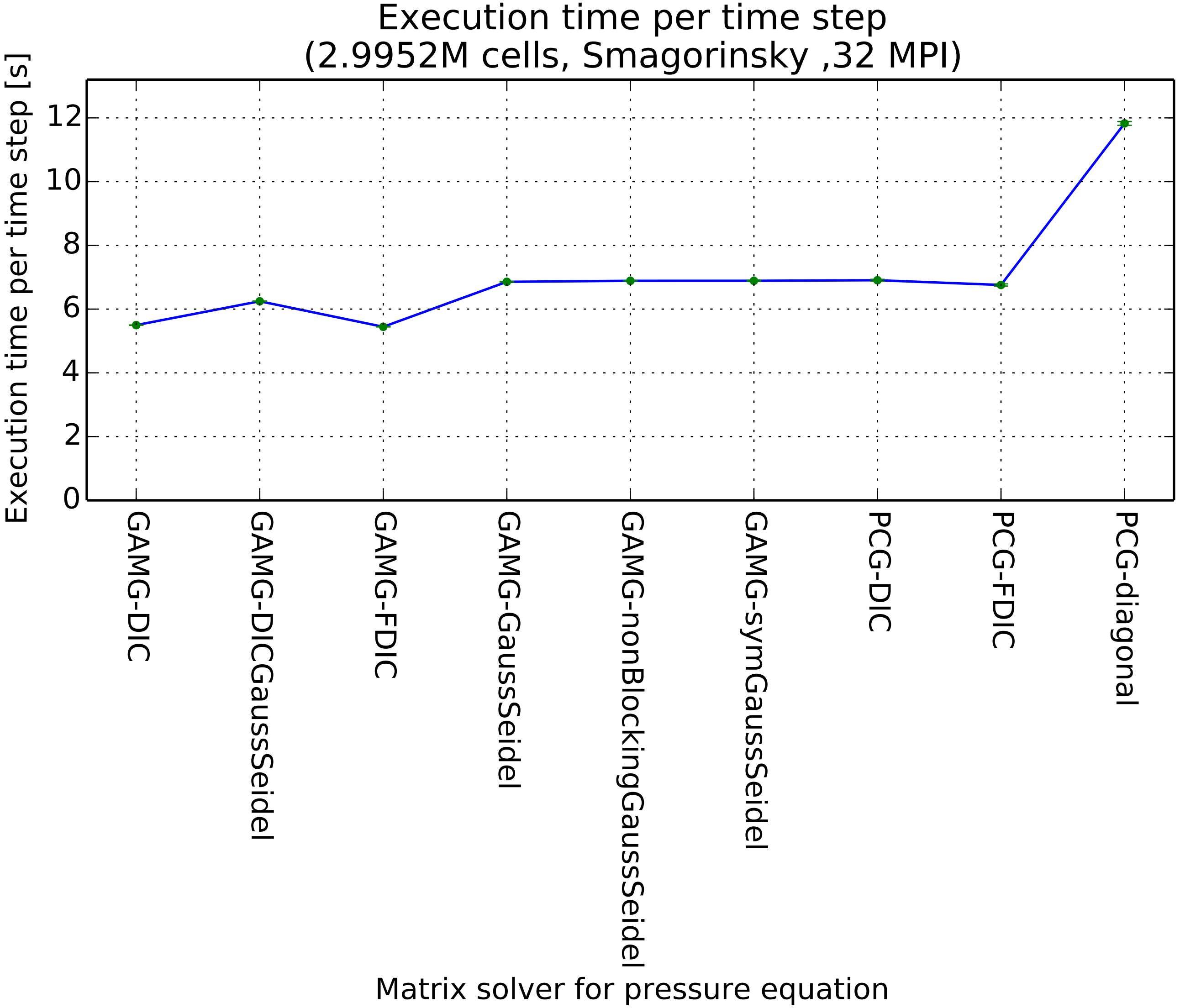
Execution time per time step
(1.48732M cells, laminar ,32 MPI)
Execution time per time step [s]
0
1
2
3
4
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

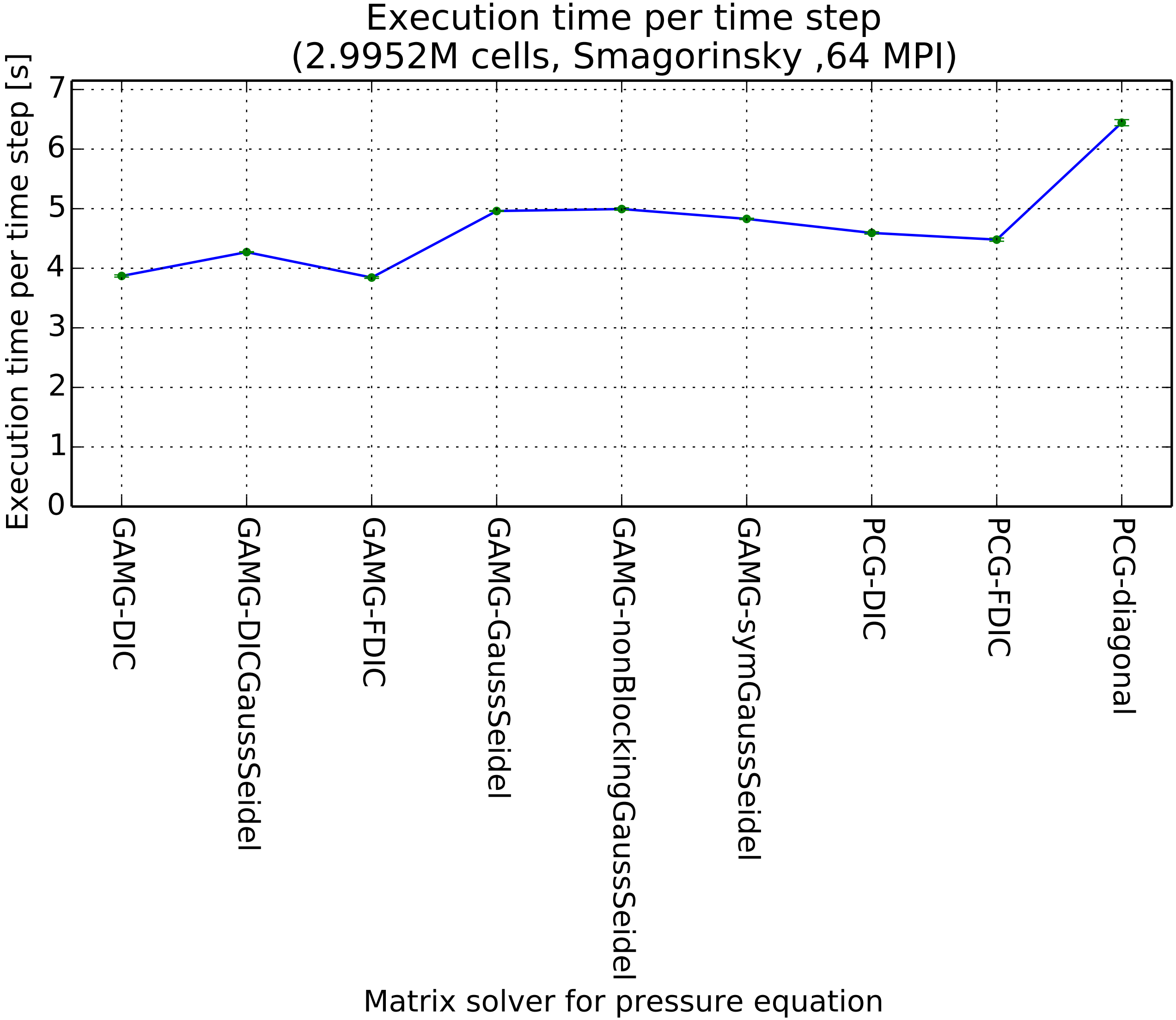

Execution time per time step
(1.48732M cells, laminar ,64 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

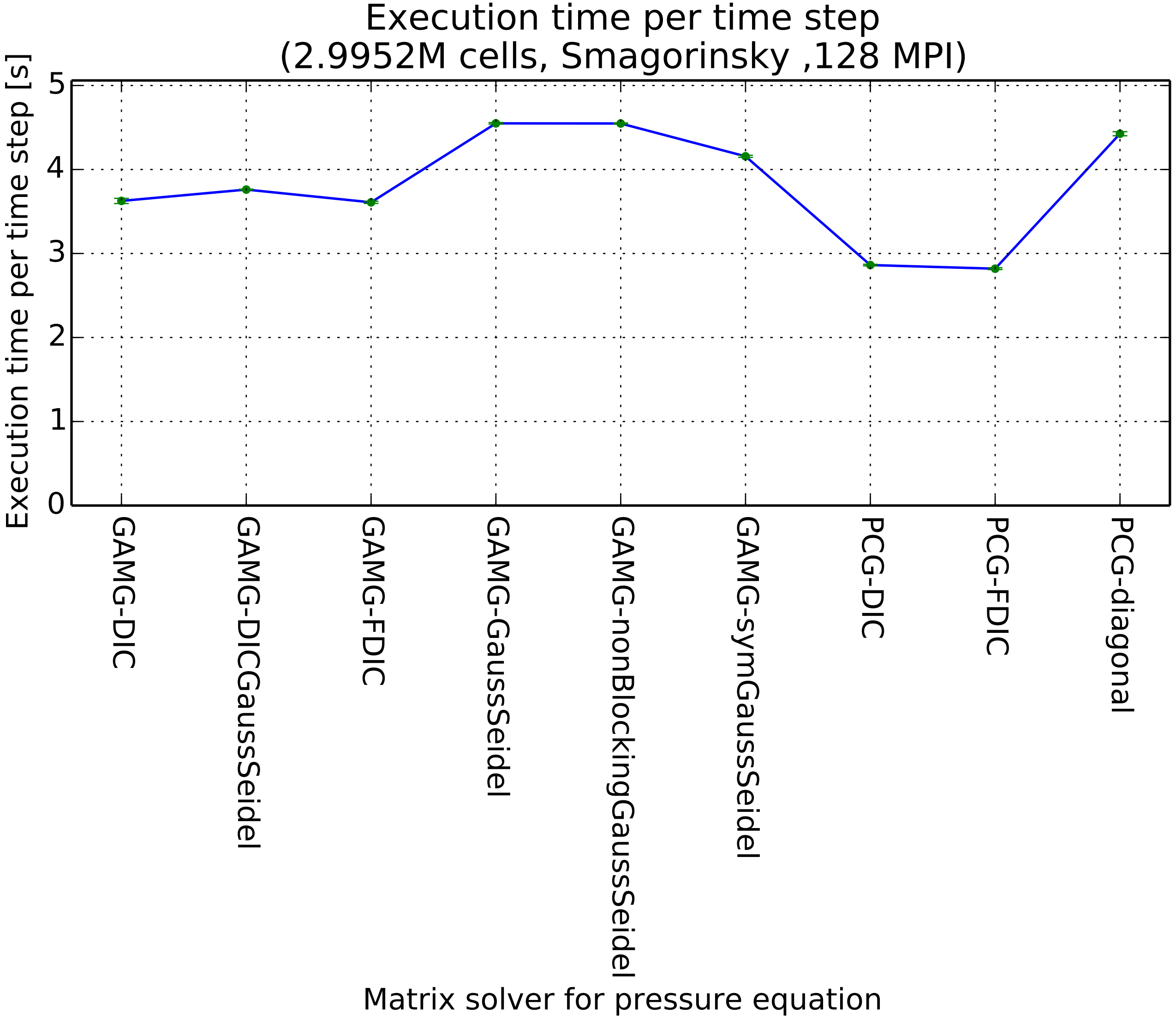

Execution time per time step
(1.48732M cells, laminar ,128 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

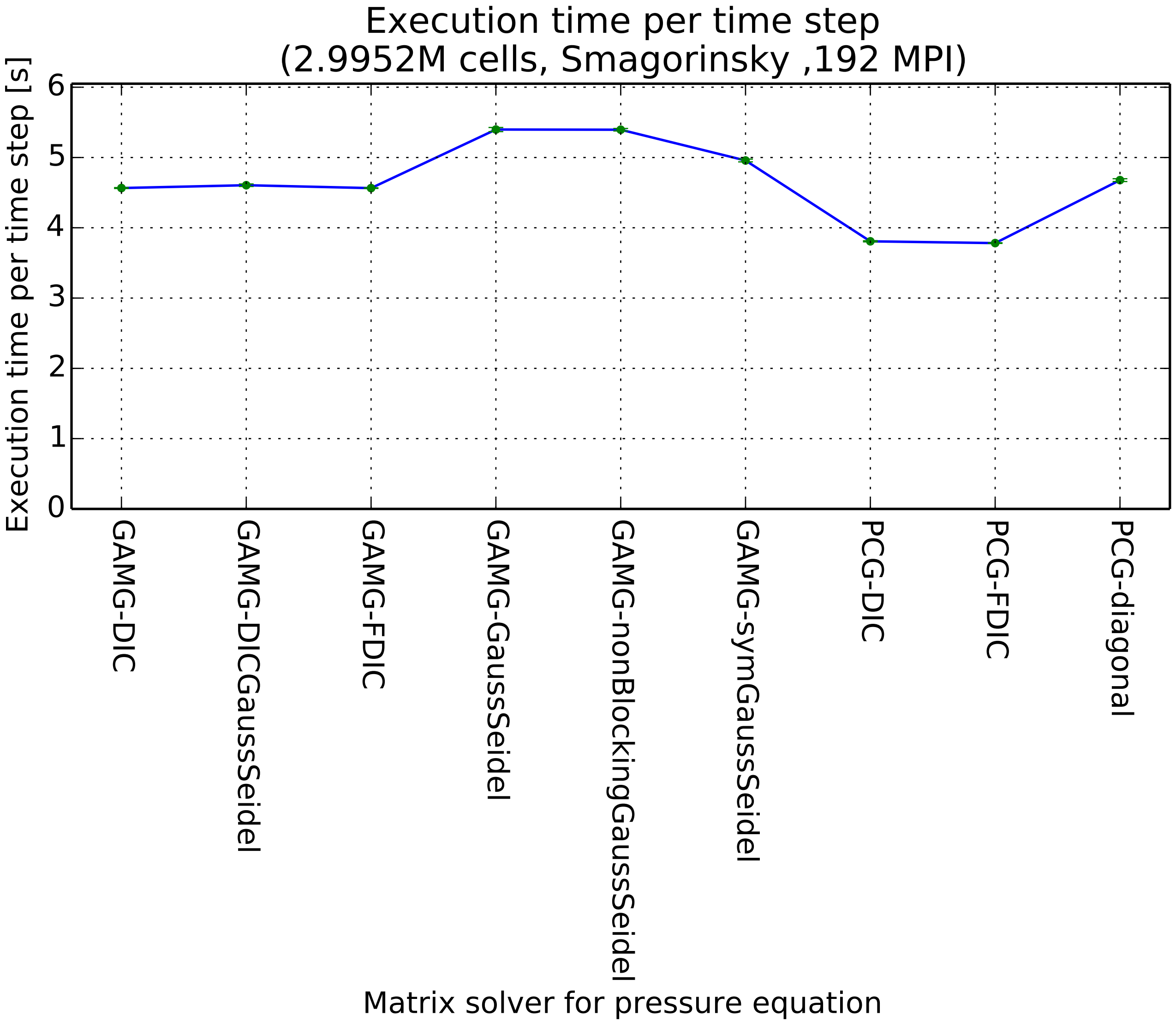

Execution time per time step
(1.48732M cells, laminar ,192 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

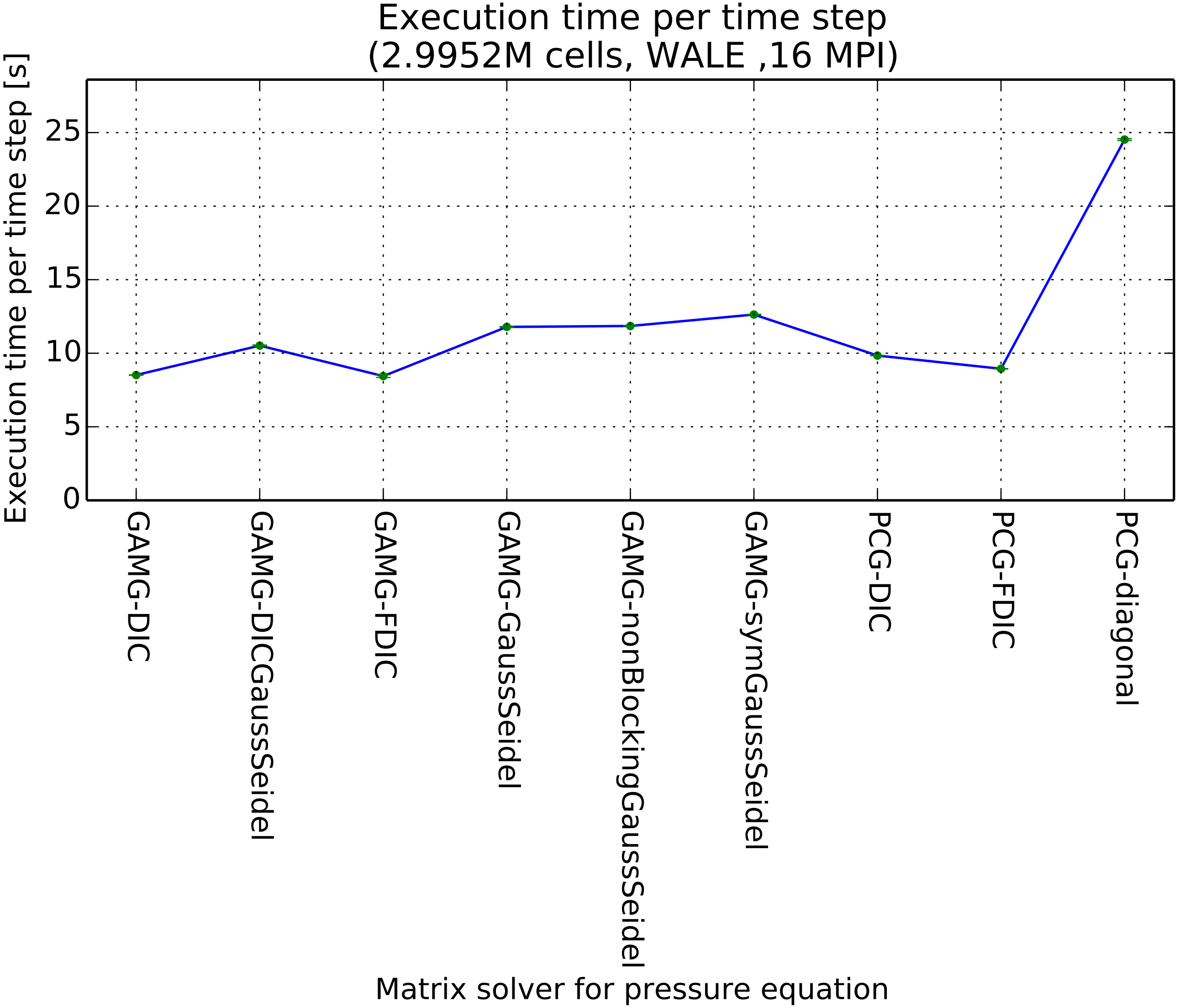

Execution time per time step
(2.9952M cells, Smagorinsky ,16 MPI)
Execution time per time step [s]
0
5
10
15
20
25
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

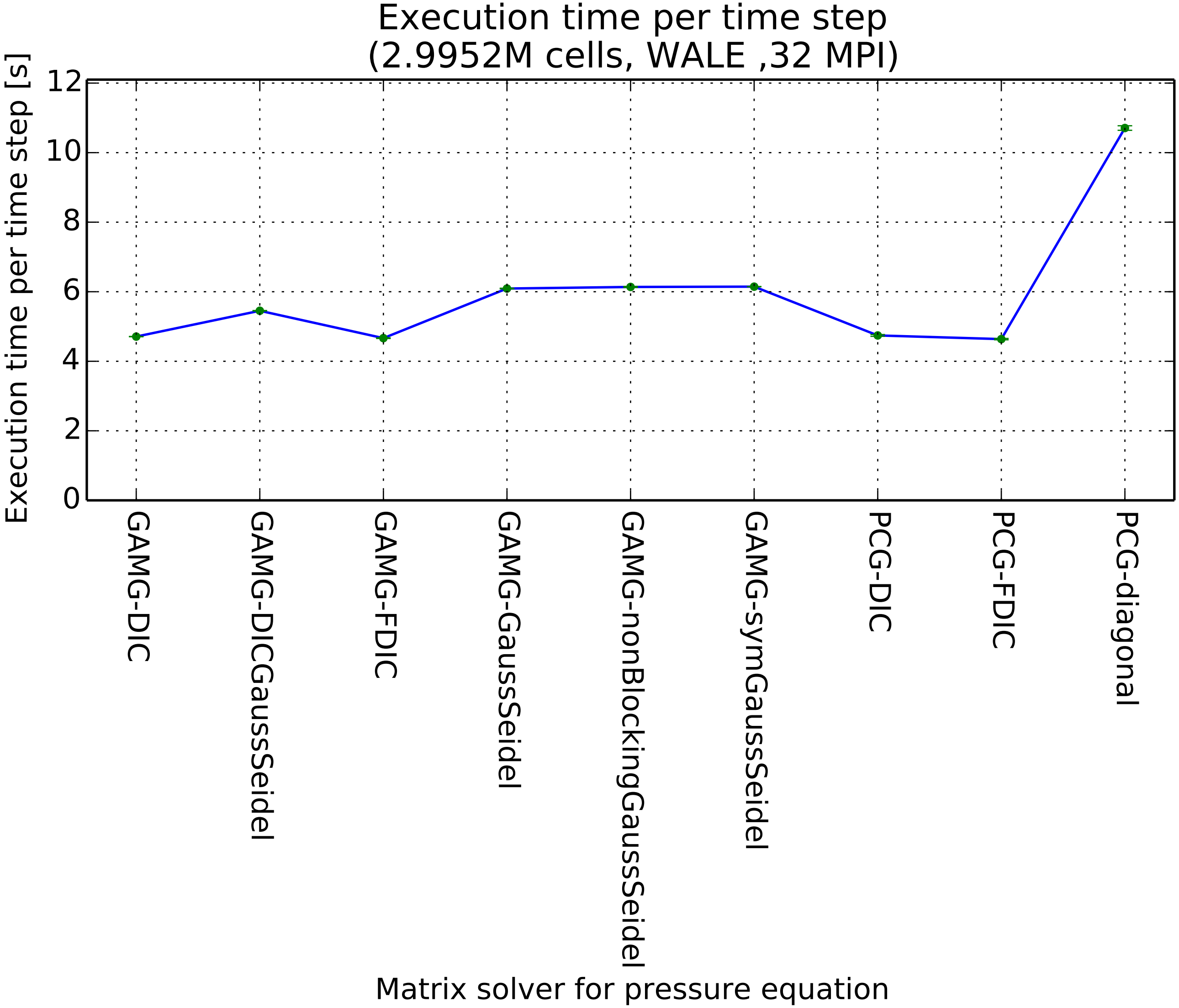

Execution time per time step
(2.9952M cells, Smagorinsky ,32 MPI)
Execution time per time step [s]
0
2
4
6
8
10
12
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

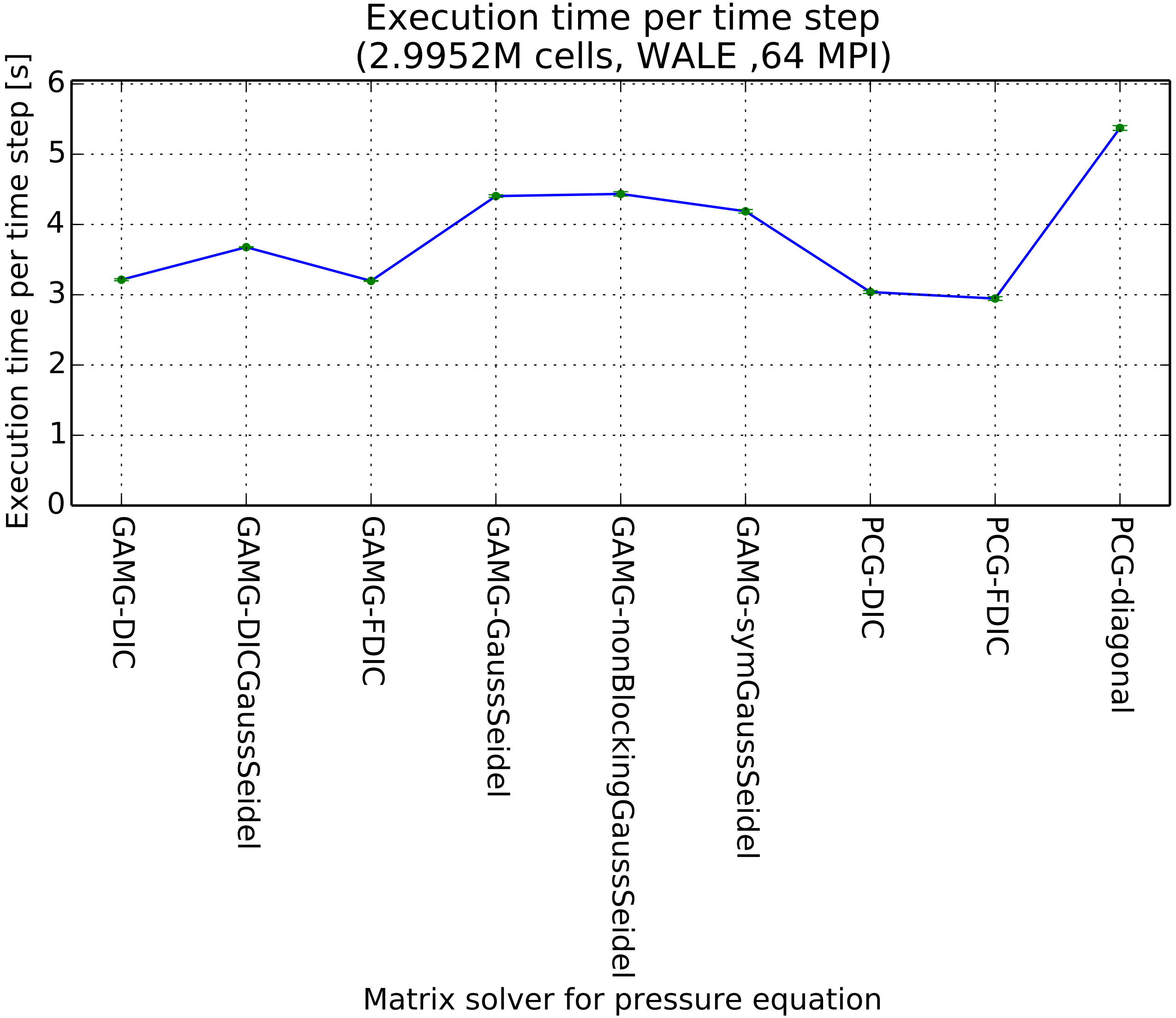

Execution time per time step
(2.9952M cells, Smagorinsky ,64 MPI)
Execution time per time step [s]
0
1
2
3
4
5
6
7
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

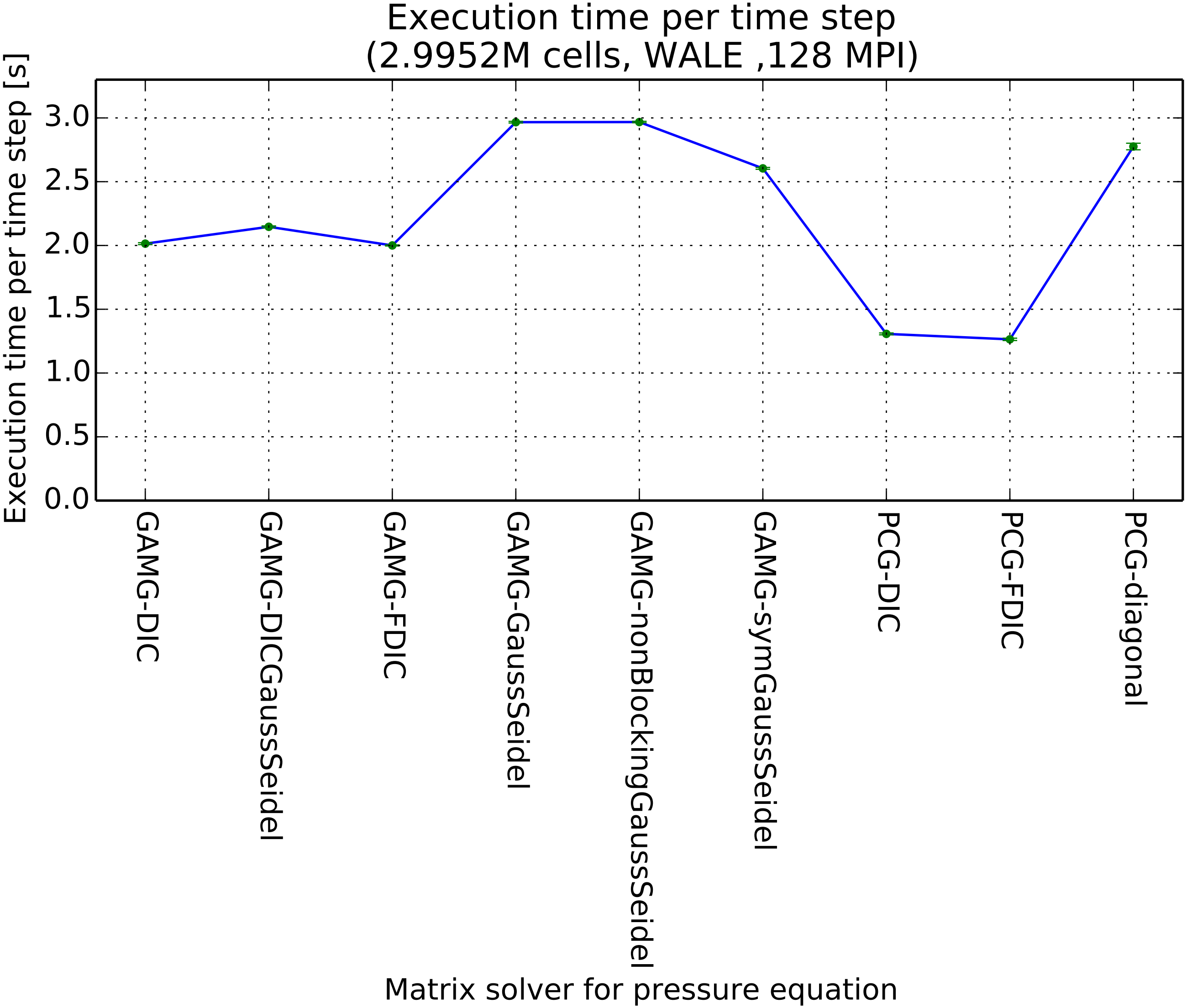
Execution time per time step
(2.9952M cells, Smagorinsky ,128 MPI)
Execution time per time step [s]
0
1
2
3
4
5
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

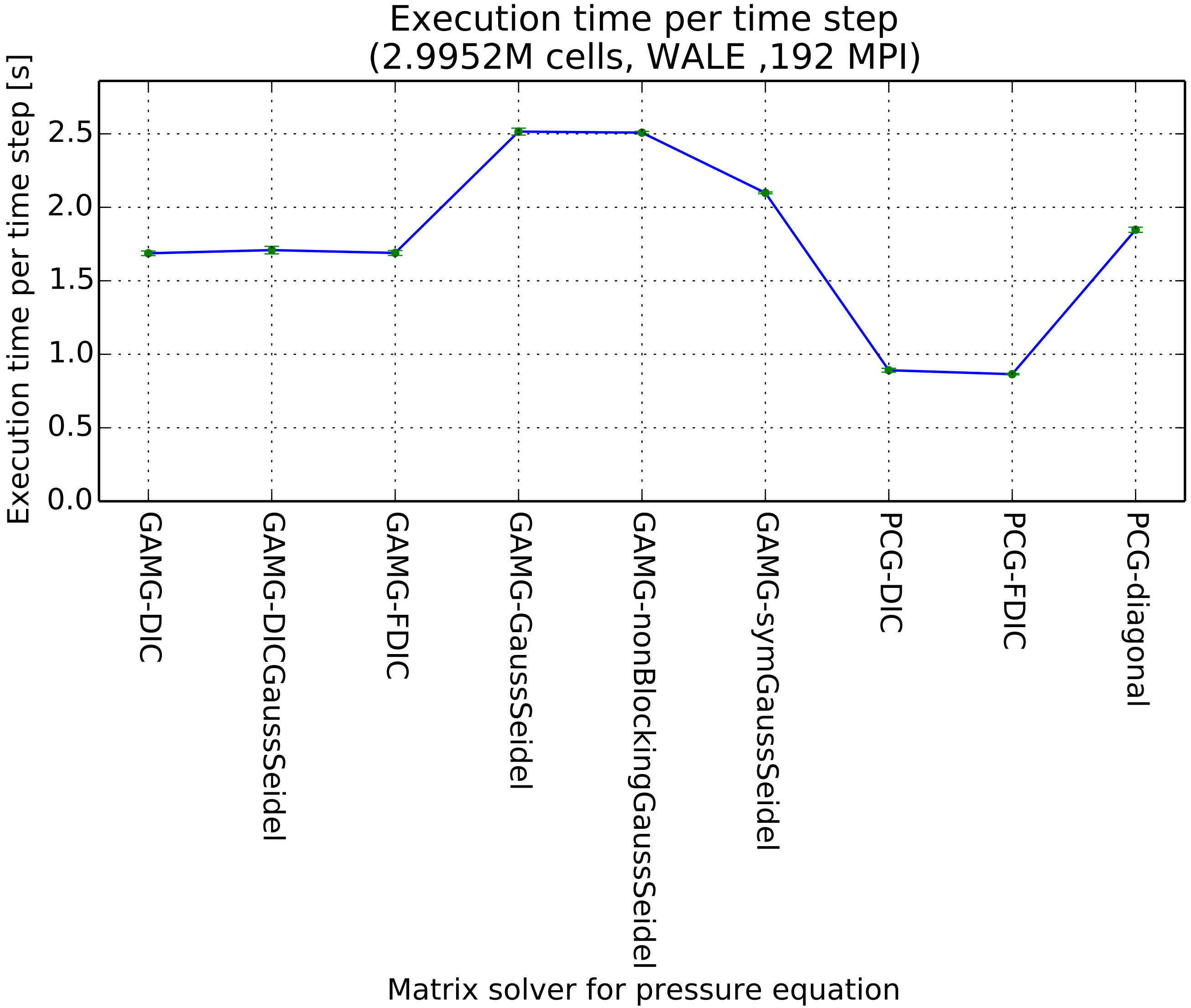

Execution time per time step
(2.9952M cells, Smagorinsky ,192 MPI)
Execution time per time step [s]
0
1
2
3
4
5
6
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation


Execution time per time step
(2.9952M cells, WALE ,16 MPI)
Execution time per time step [s]
0
5
10
15
20
25
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

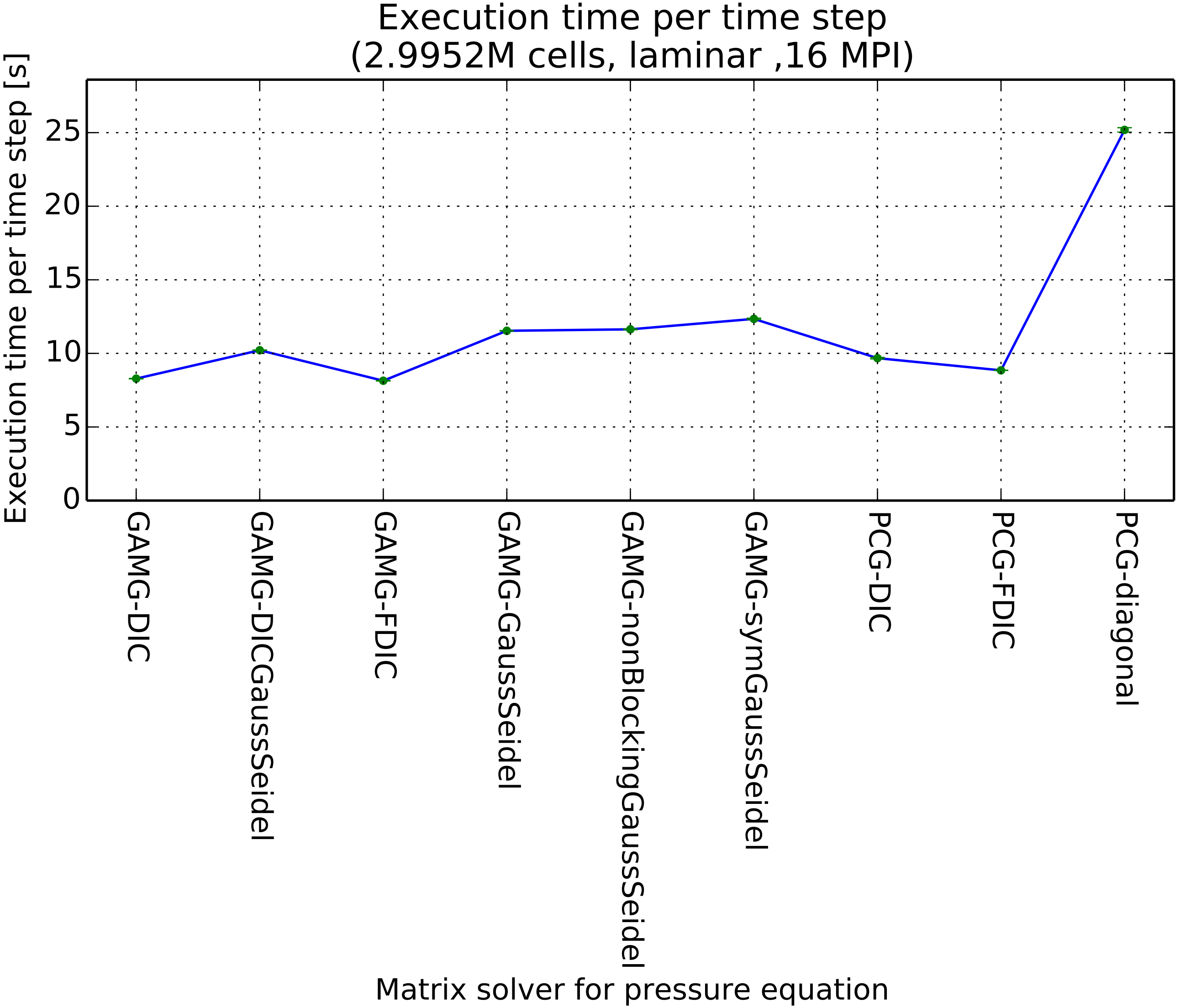

Execution time per time step
(2.9952M cells, WALE ,32 MPI)
Execution time per time step [s]
0
2
4
6
8
10
12
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

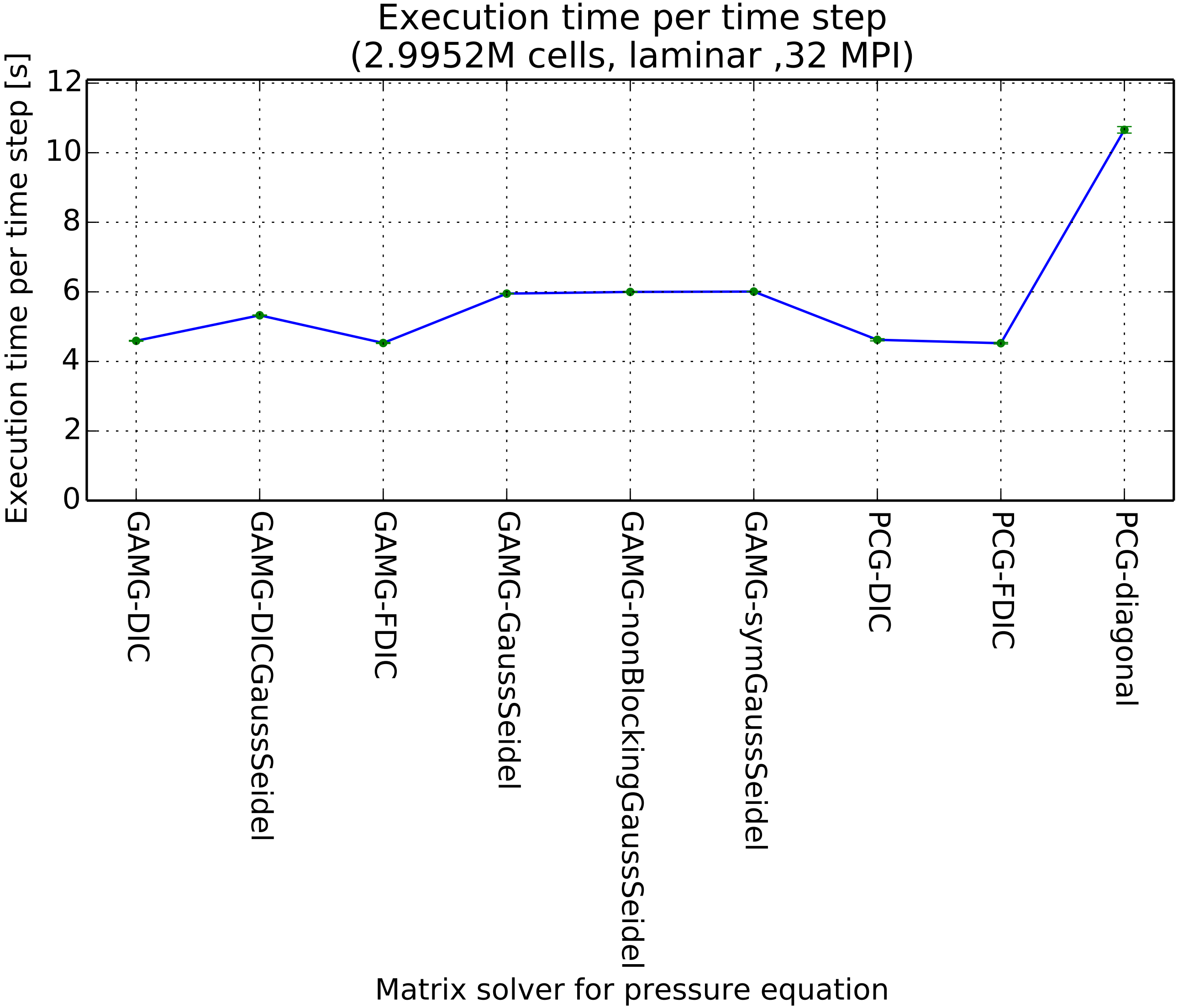

Execution time per time step
(2.9952M cells, WALE ,64 MPI)
Execution time per time step [s]
0
1
2
3
4
5
6
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

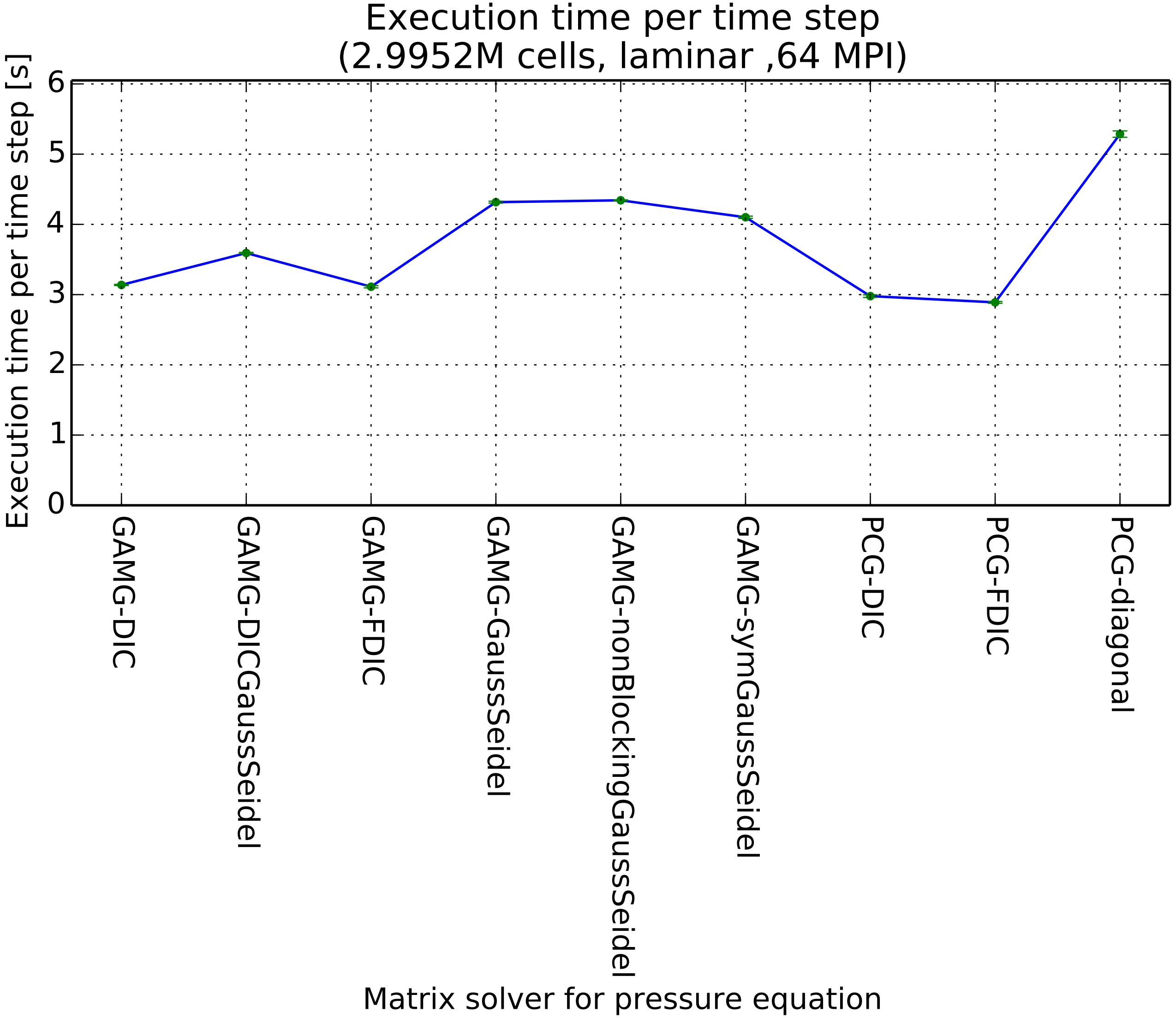

Execution time per time step
(2.9952M cells, WALE ,128 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

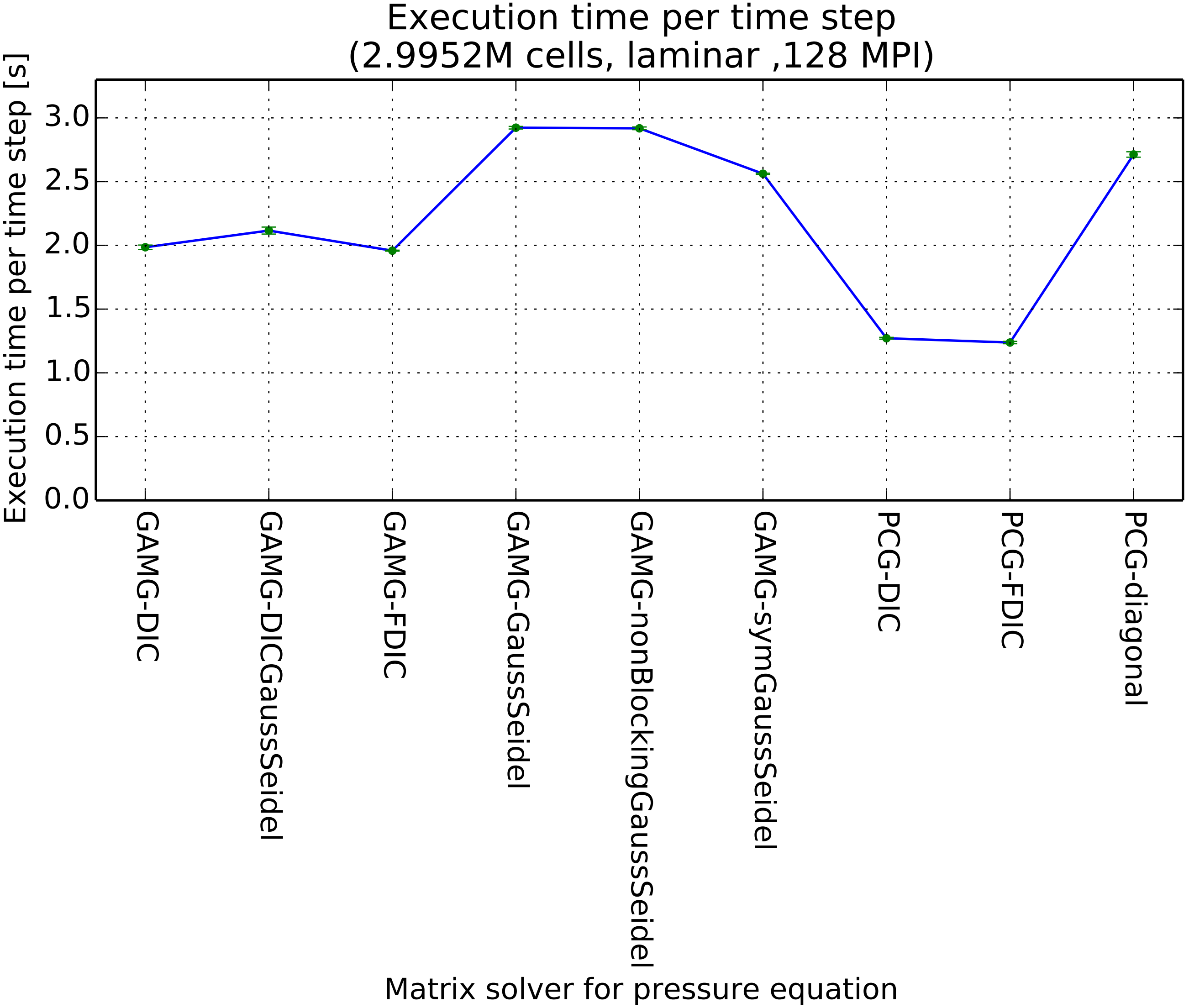


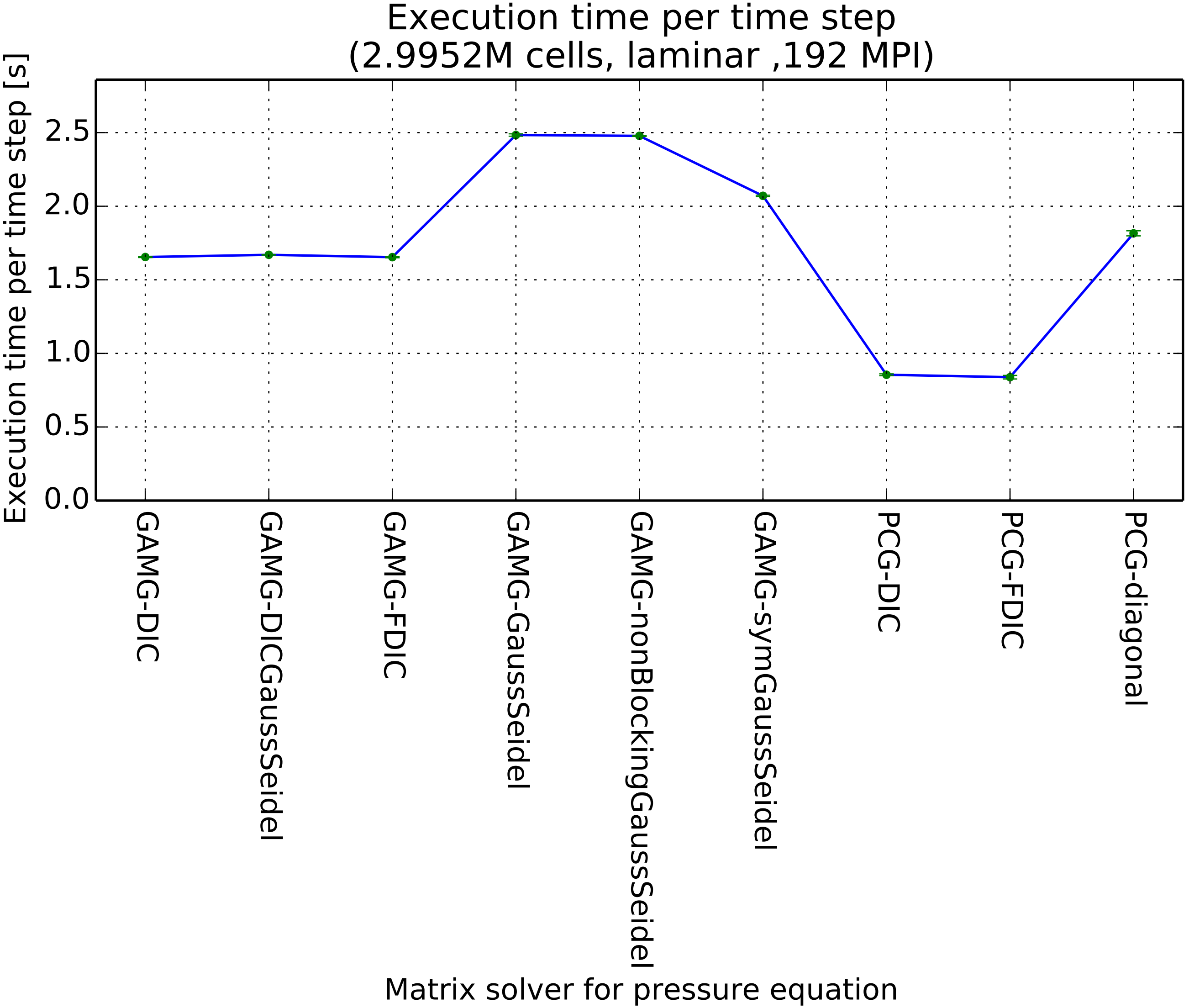
Execution time per time step
(2.9952M cells, WALE ,192 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

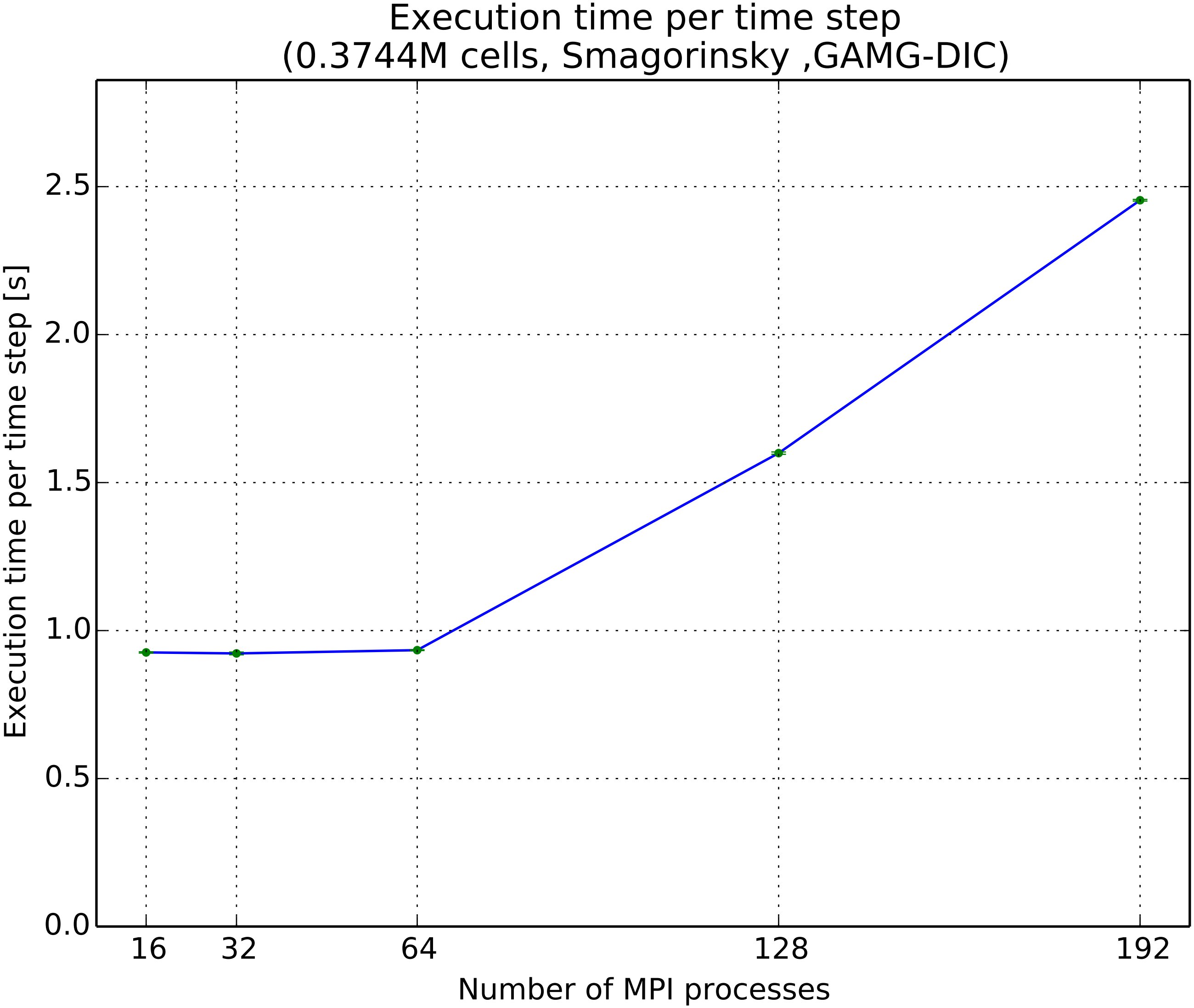

Execution time per time step
(2.9952M cells, laminar ,16 MPI)
Execution time per time step [s]
0
5
10
15
20
25
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

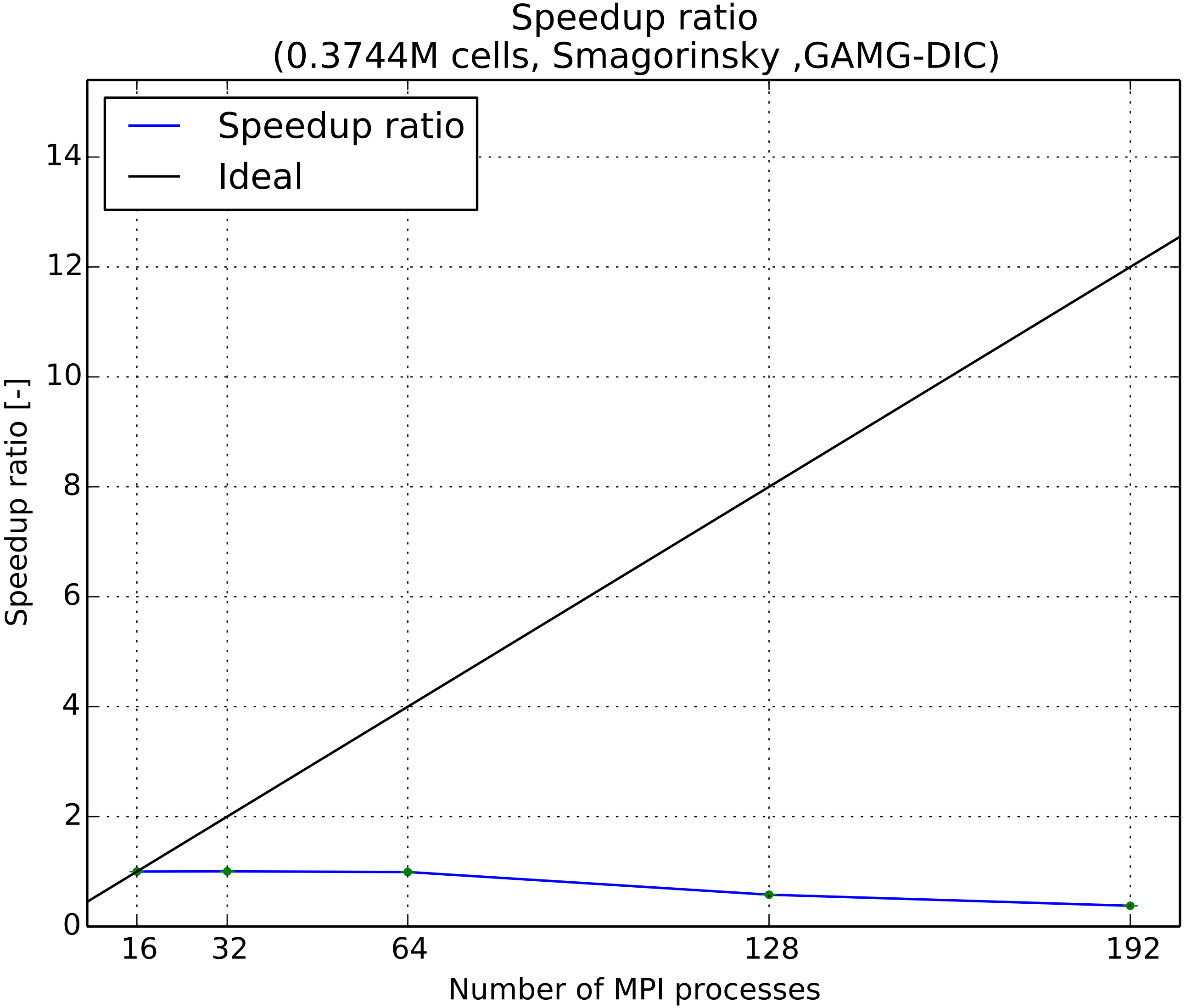

Execution time per time step
(2.9952M cells, laminar ,32 MPI)
Execution time per time step [s]
0
2
4
6
8
10
12
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

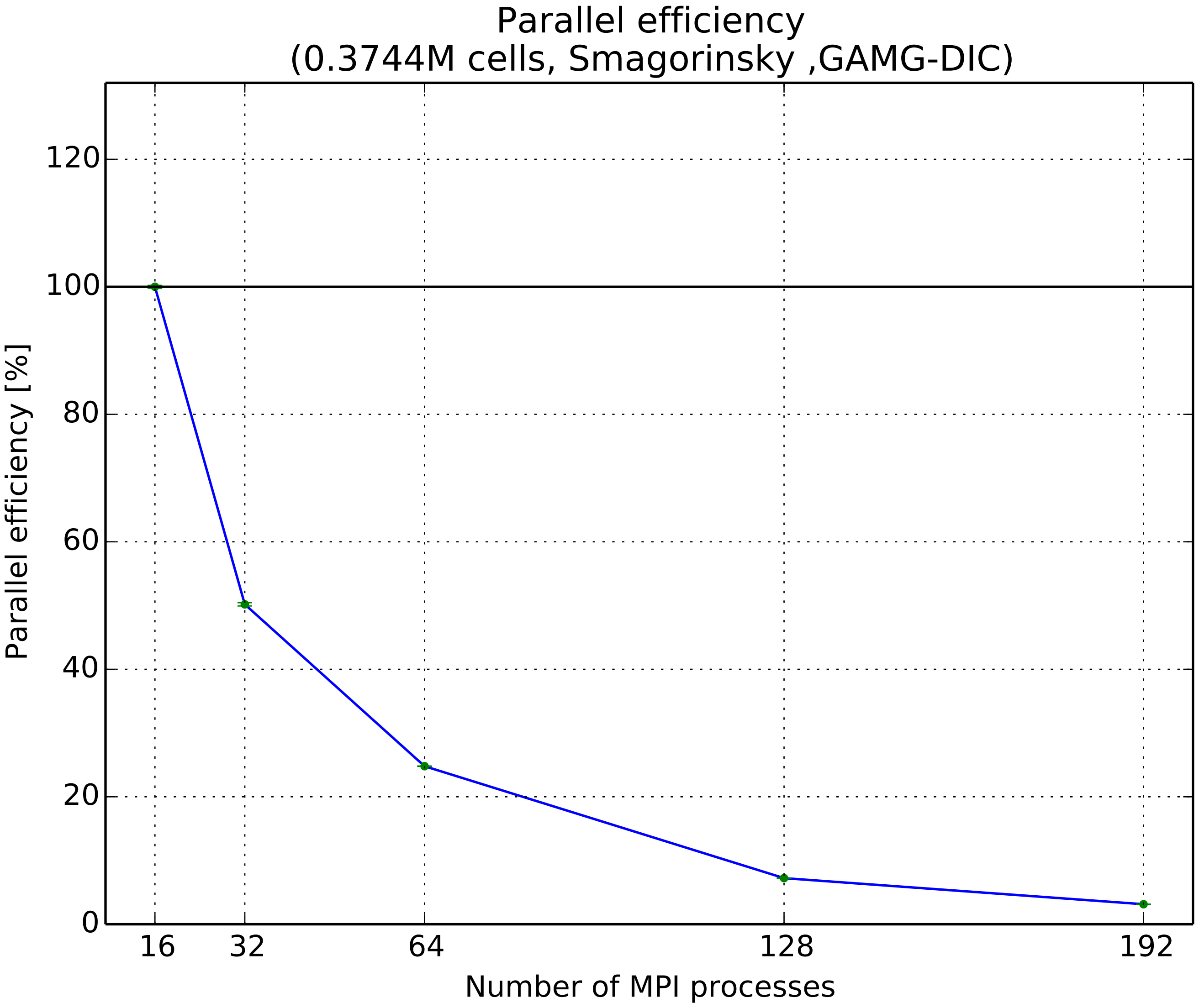

Execution time per time step
(2.9952M cells, laminar ,64 MPI)
Execution time per time step [s]
0
1
2
3
4
5
6
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

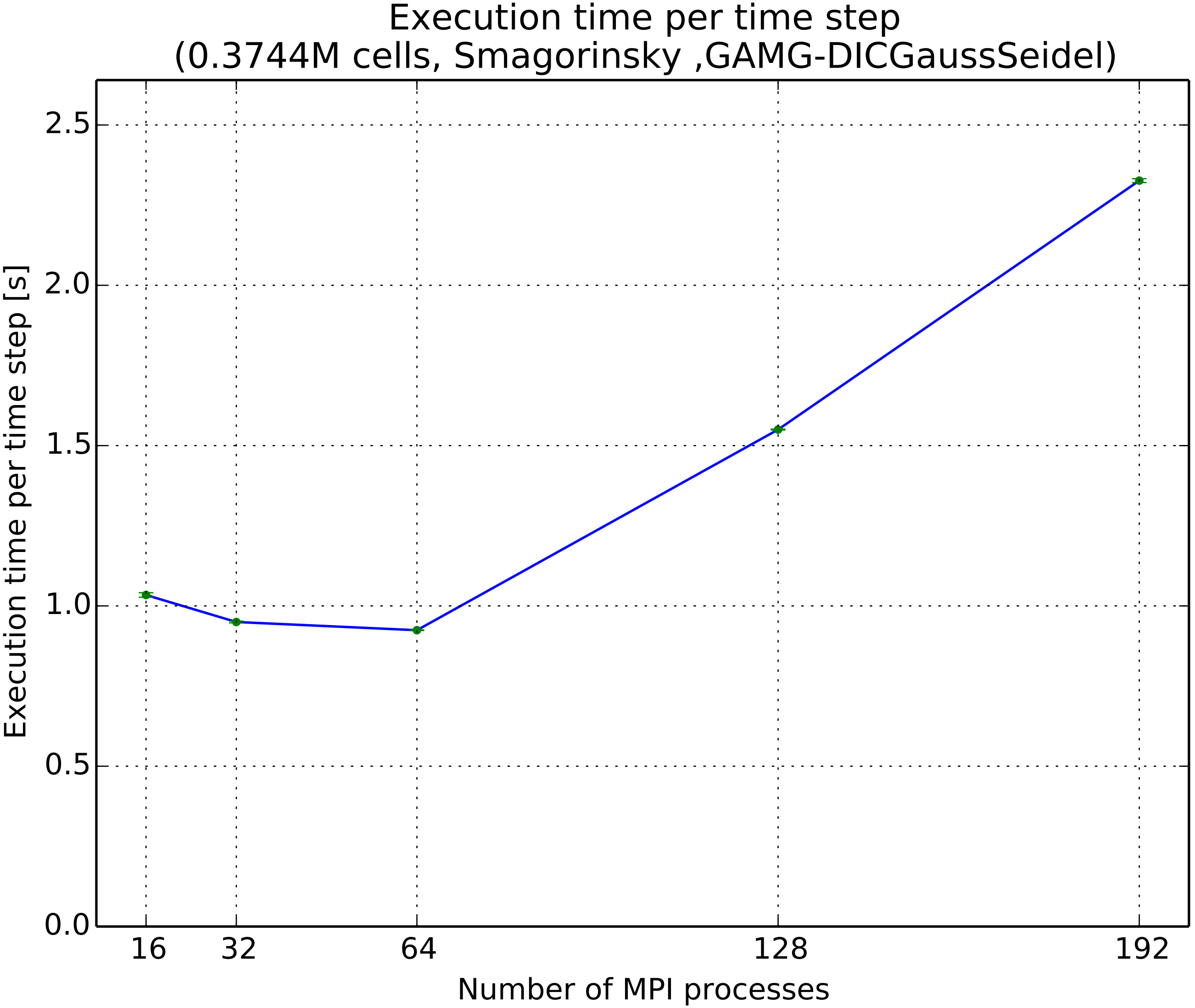

Execution time per time step
(2.9952M cells, laminar ,128 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

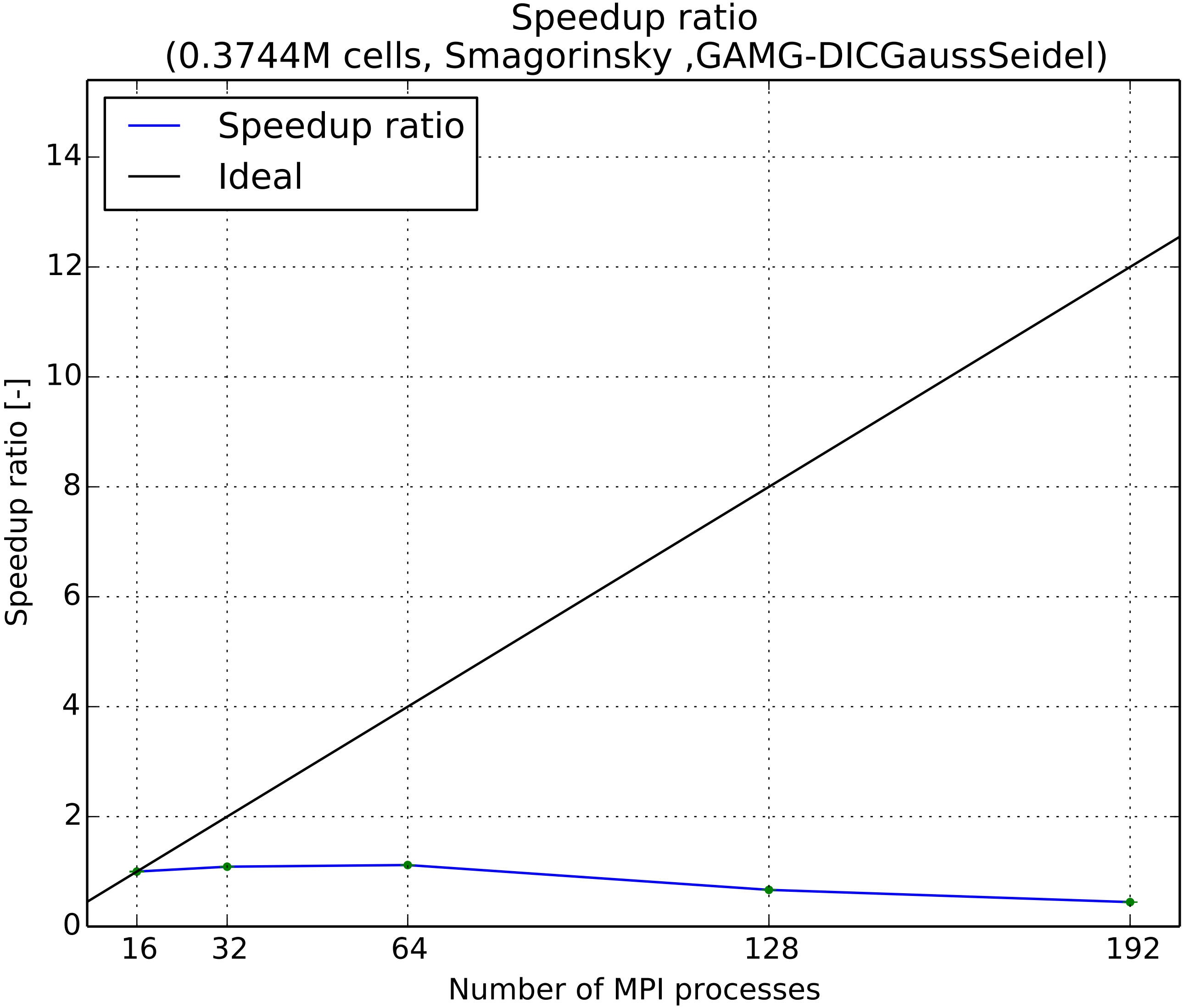

Execution time per time step
(2.9952M cells, laminar ,192 MPI)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
GAMG-DIC
GAMG-DICGaussSeidel
GAMG-FDIC
GAMG-GaussSeidel
GAMG-nonBlockingGaussSeidel
GAMG-symGaussSeidel
PCG-DIC
PCG-FDIC
PCG-diagonal
Matrix solver for pressure equation

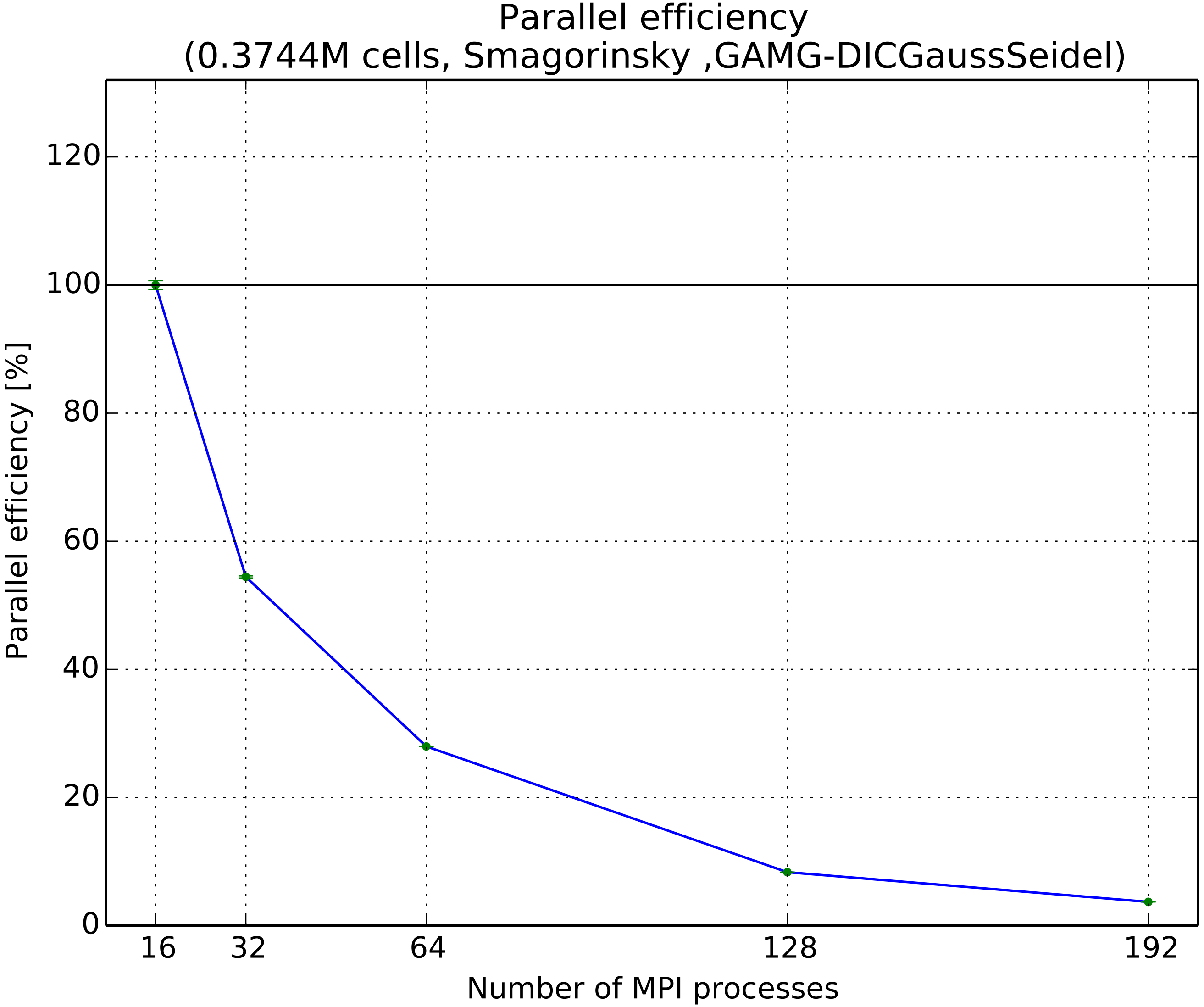

Execution time per time step
(0.3744M cells, Smagorinsky ,GAMG-DIC)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
16
32
64
128
192
Number of MPI processes

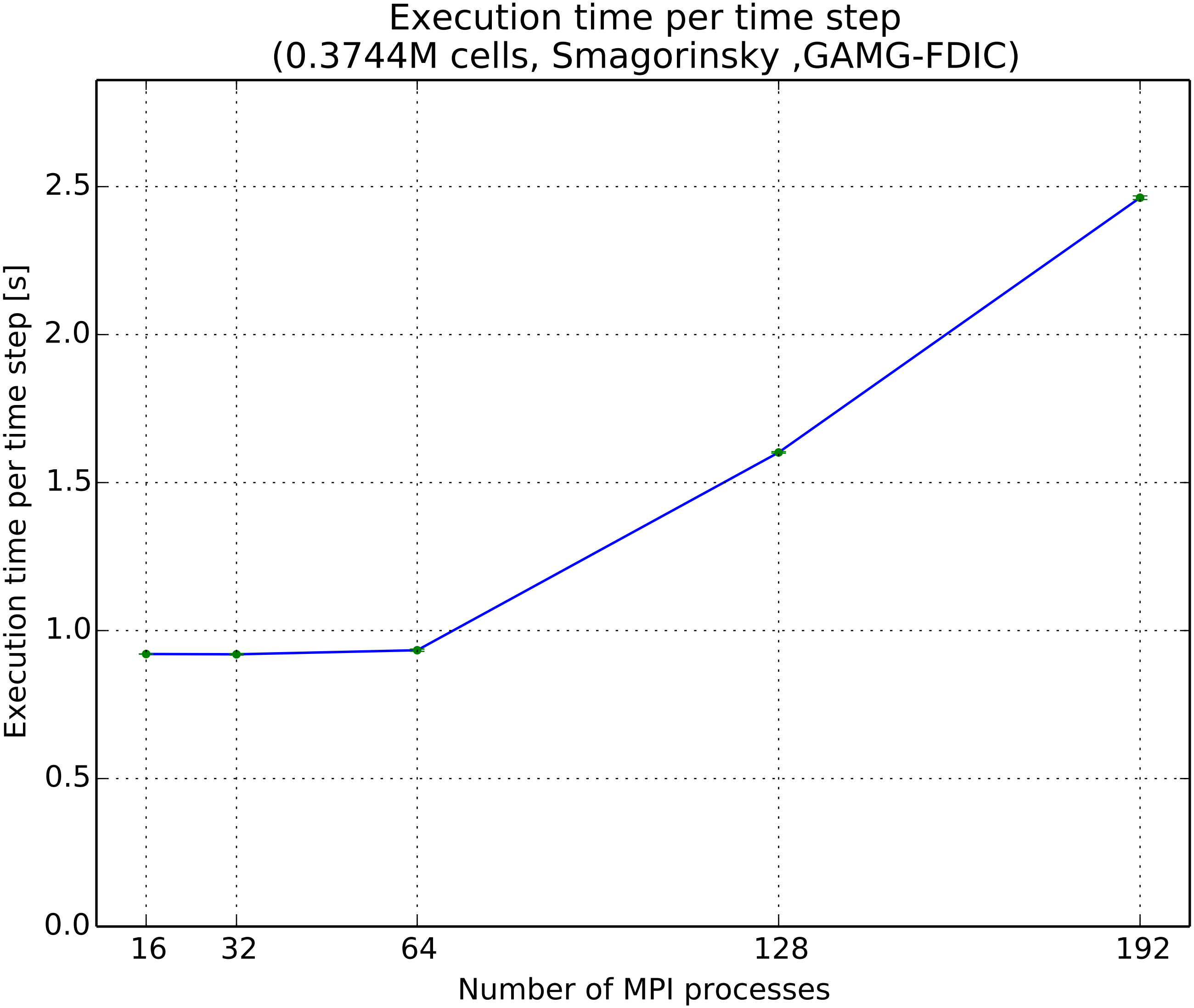

Speedup ratio
(0.3744M cells, Smagorinsky ,GAMG-DIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

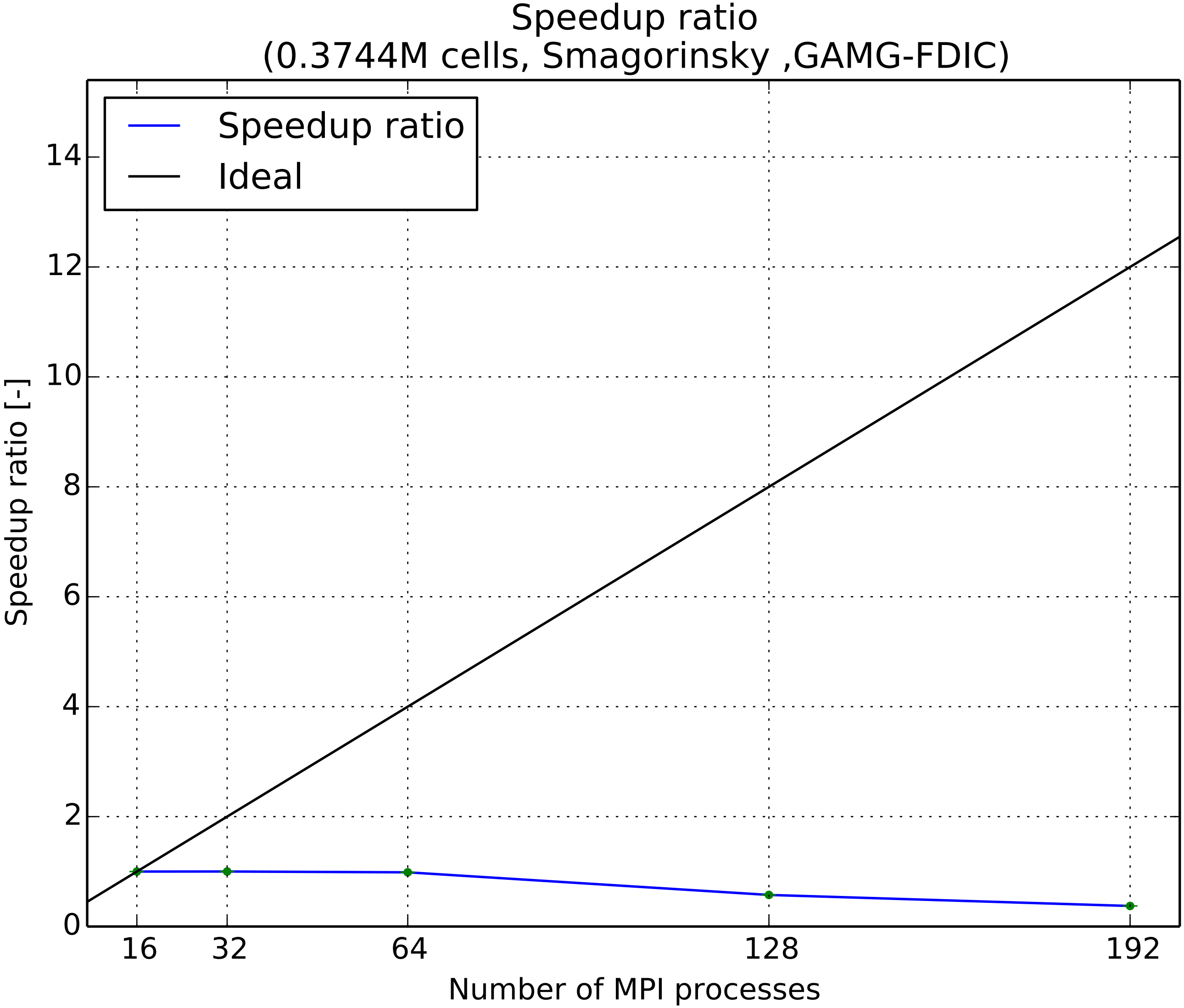

Parallel efficiency
(0.3744M cells, Smagorinsky ,GAMG-DIC)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes

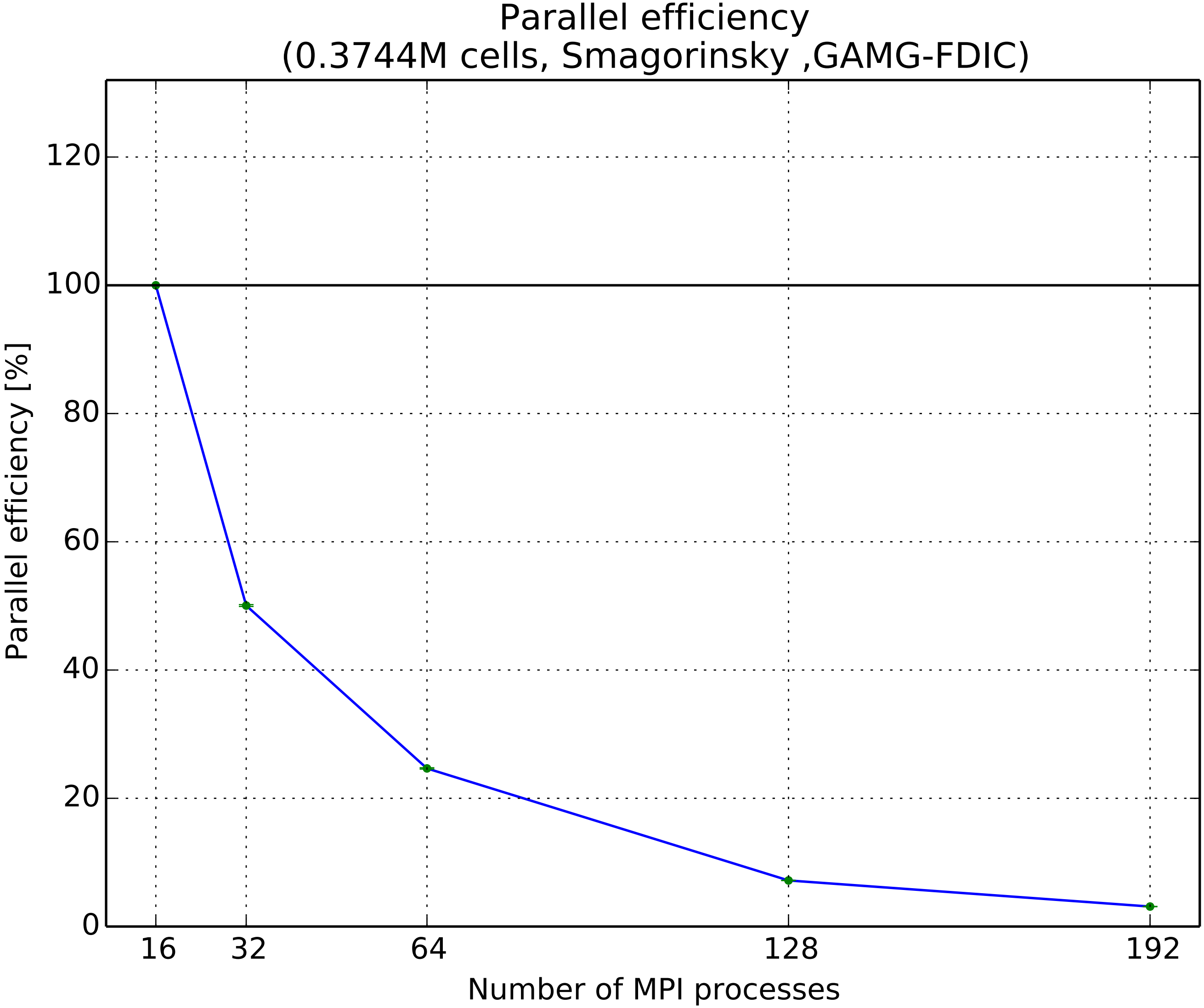

Execution time per time step
(0.3744M cells, Smagorinsky ,GAMG-DICGaussSeidel)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
16
32
64
128
192
Number of MPI processes

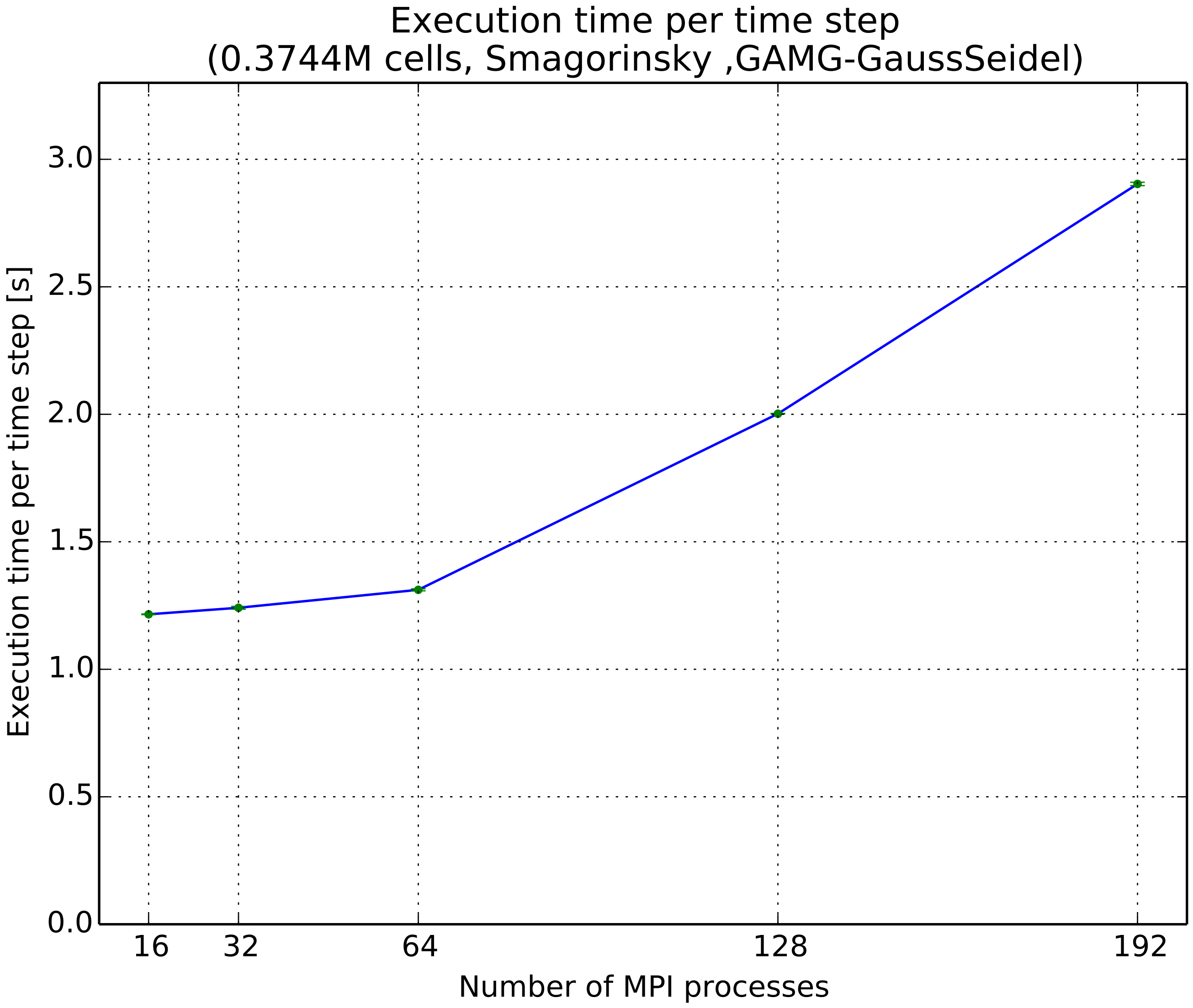

Speedup ratio
(0.3744M cells, Smagorinsky ,GAMG-DICGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

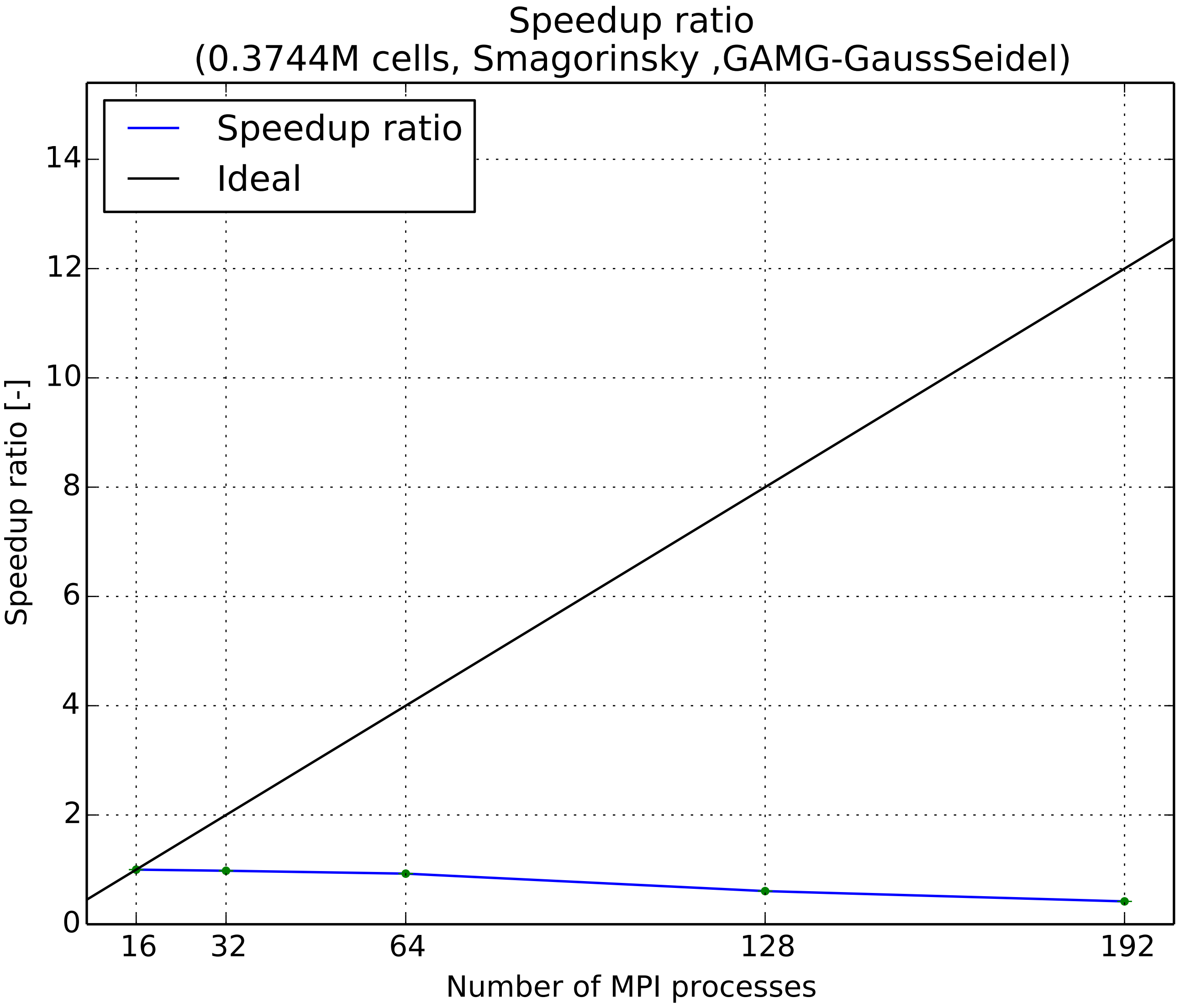

Parallel efficiency
(0.3744M cells, Smagorinsky ,GAMG-DICGaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes

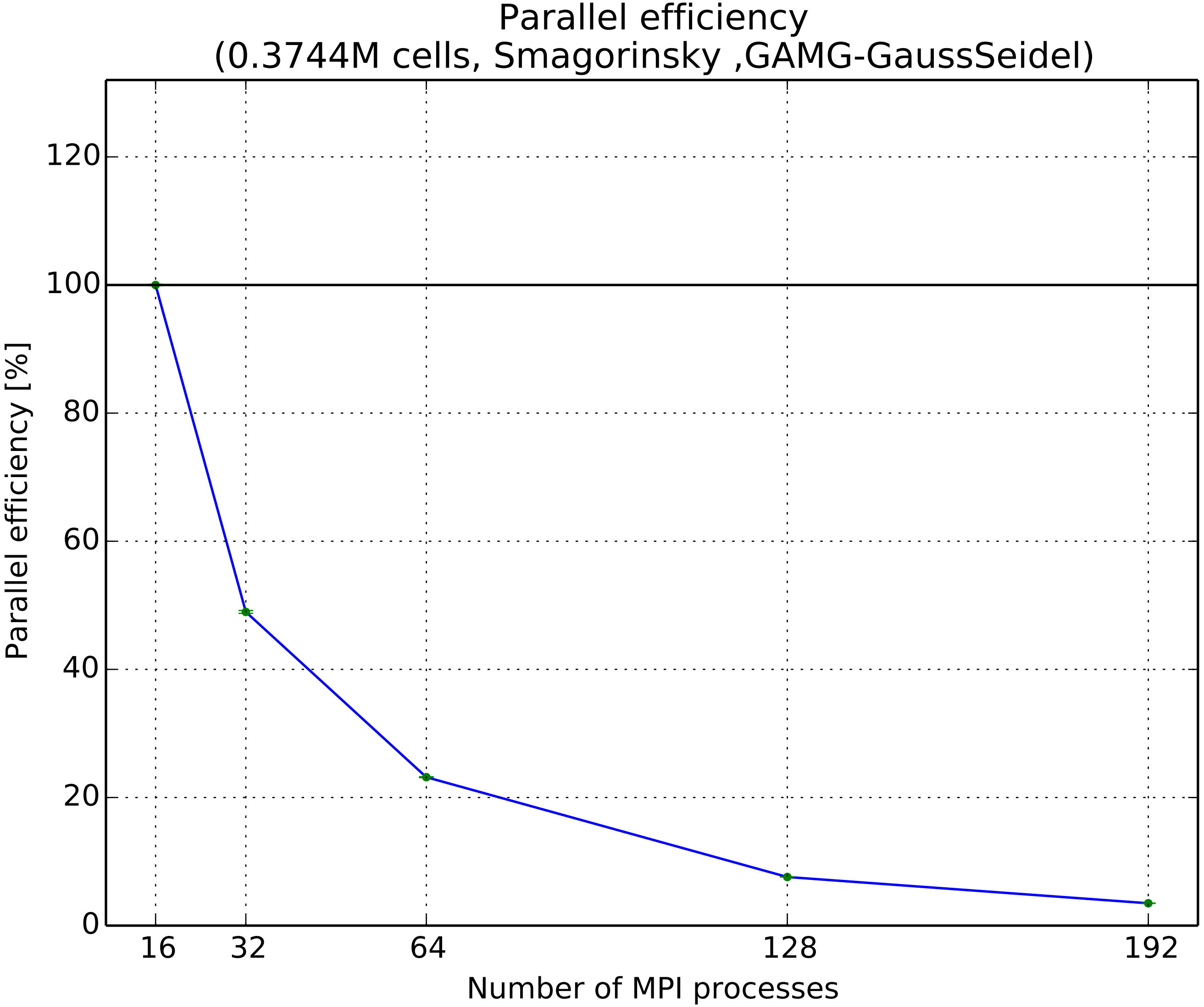

Execution time per time step
(0.3744M cells, Smagorinsky ,GAMG-FDIC)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
16
32
64
128
192
Number of MPI processes

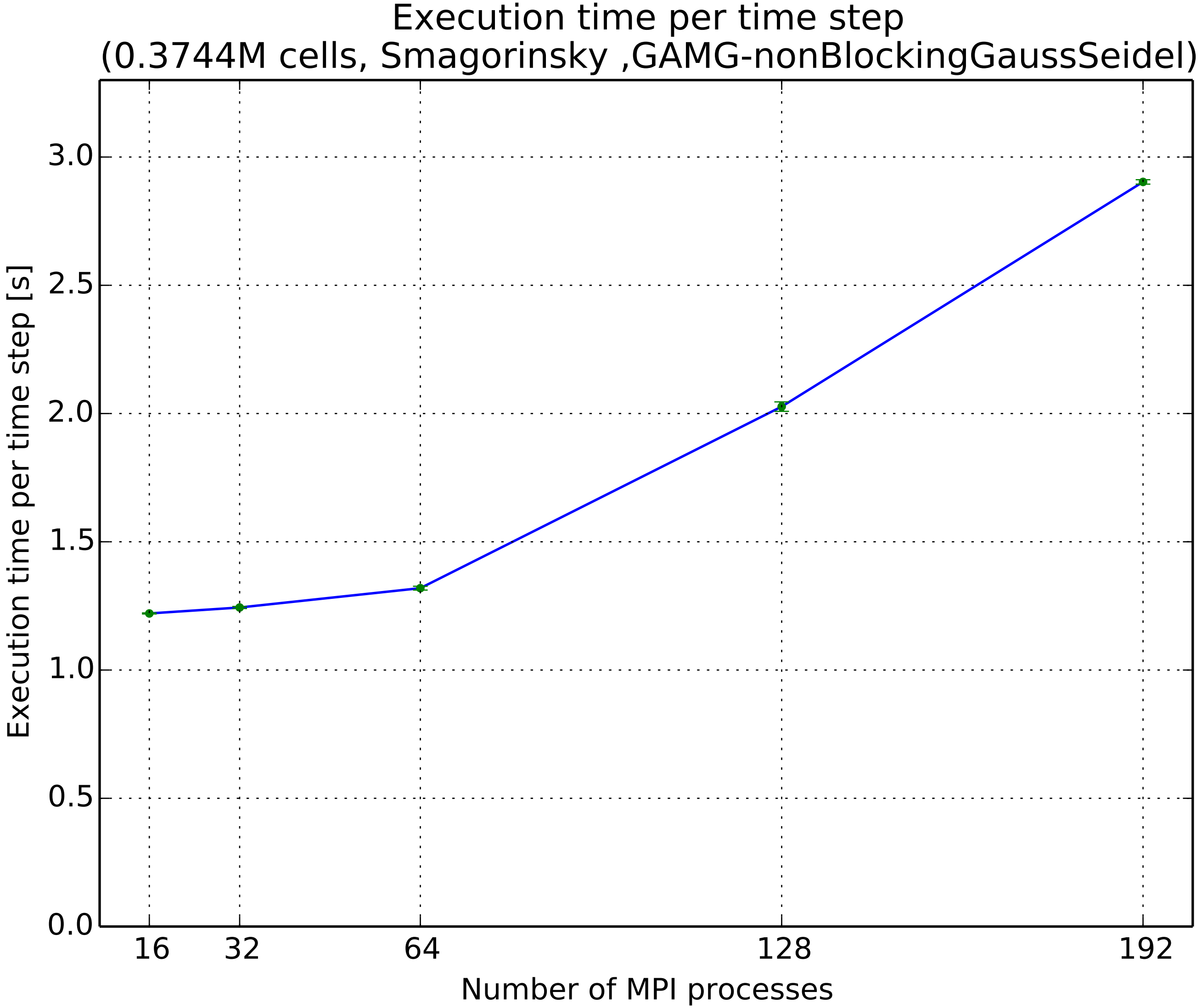

Speedup ratio
(0.3744M cells, Smagorinsky ,GAMG-FDIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

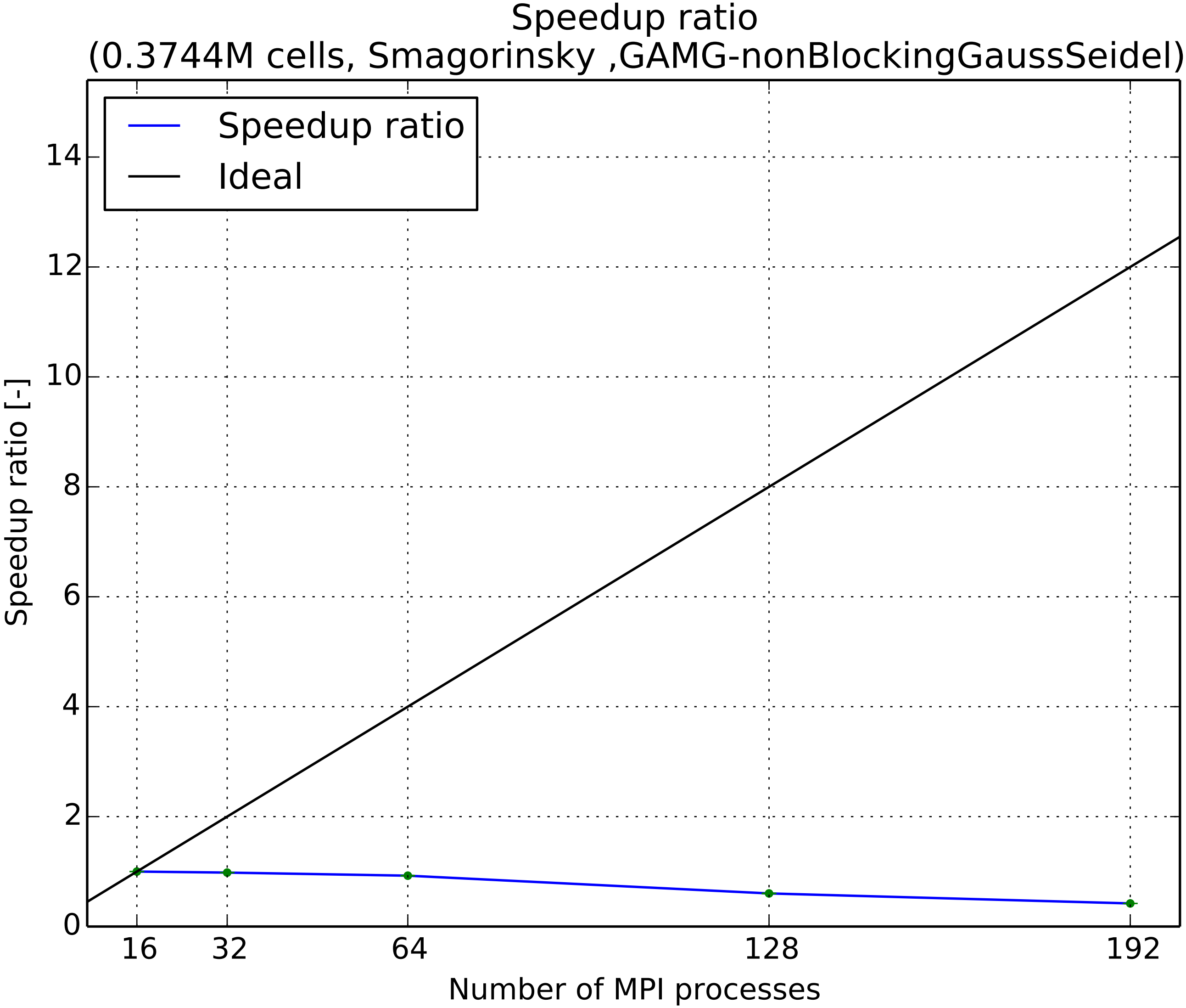

Parallel efficiency
(0.3744M cells, Smagorinsky ,GAMG-FDIC)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes

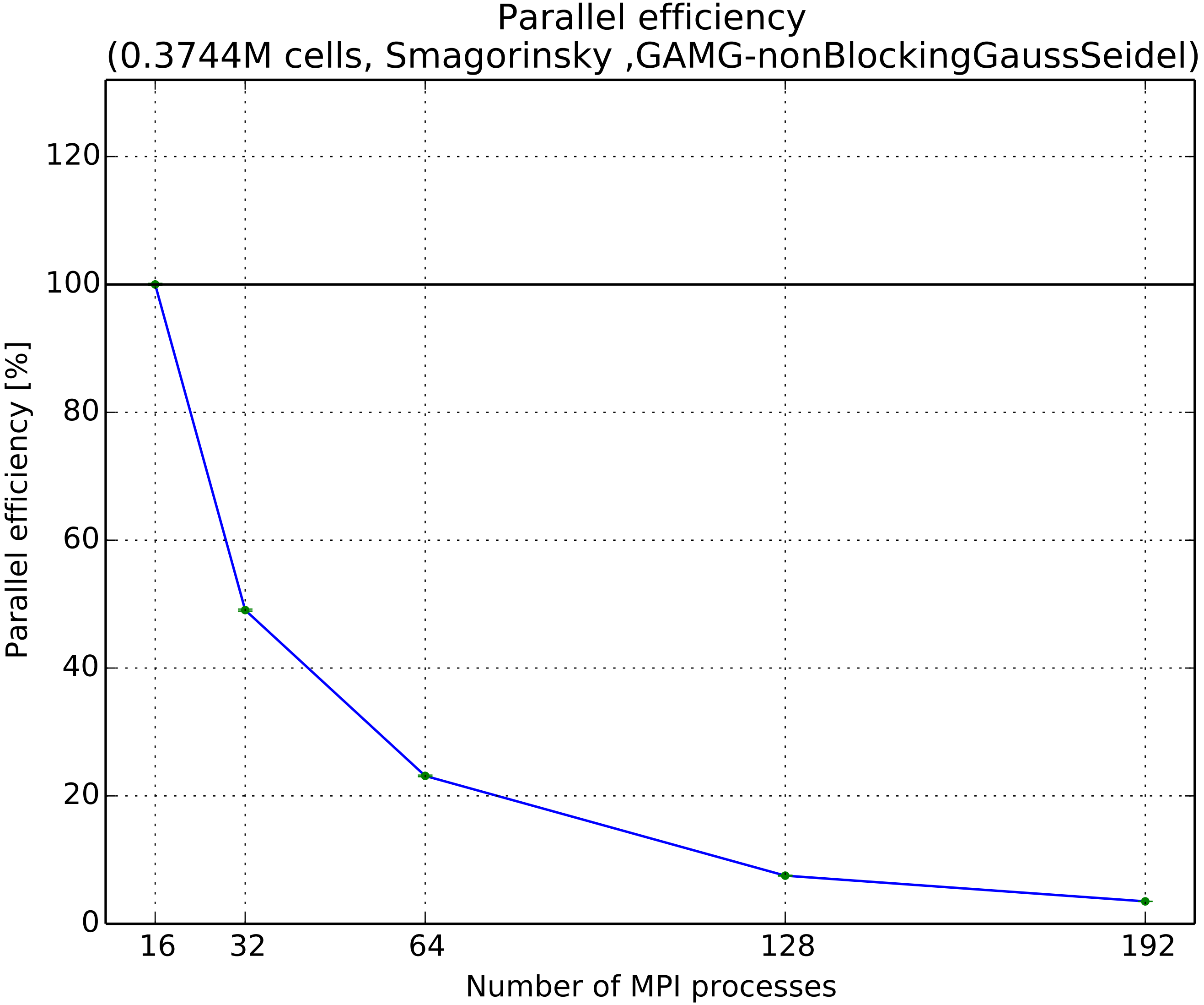

Execution time per time step
(0.3744M cells, Smagorinsky ,GAMG-GaussSeidel)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
16
32
64
128
192
Number of MPI processes


Speedup ratio
(0.3744M cells, Smagorinsky ,GAMG-GaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

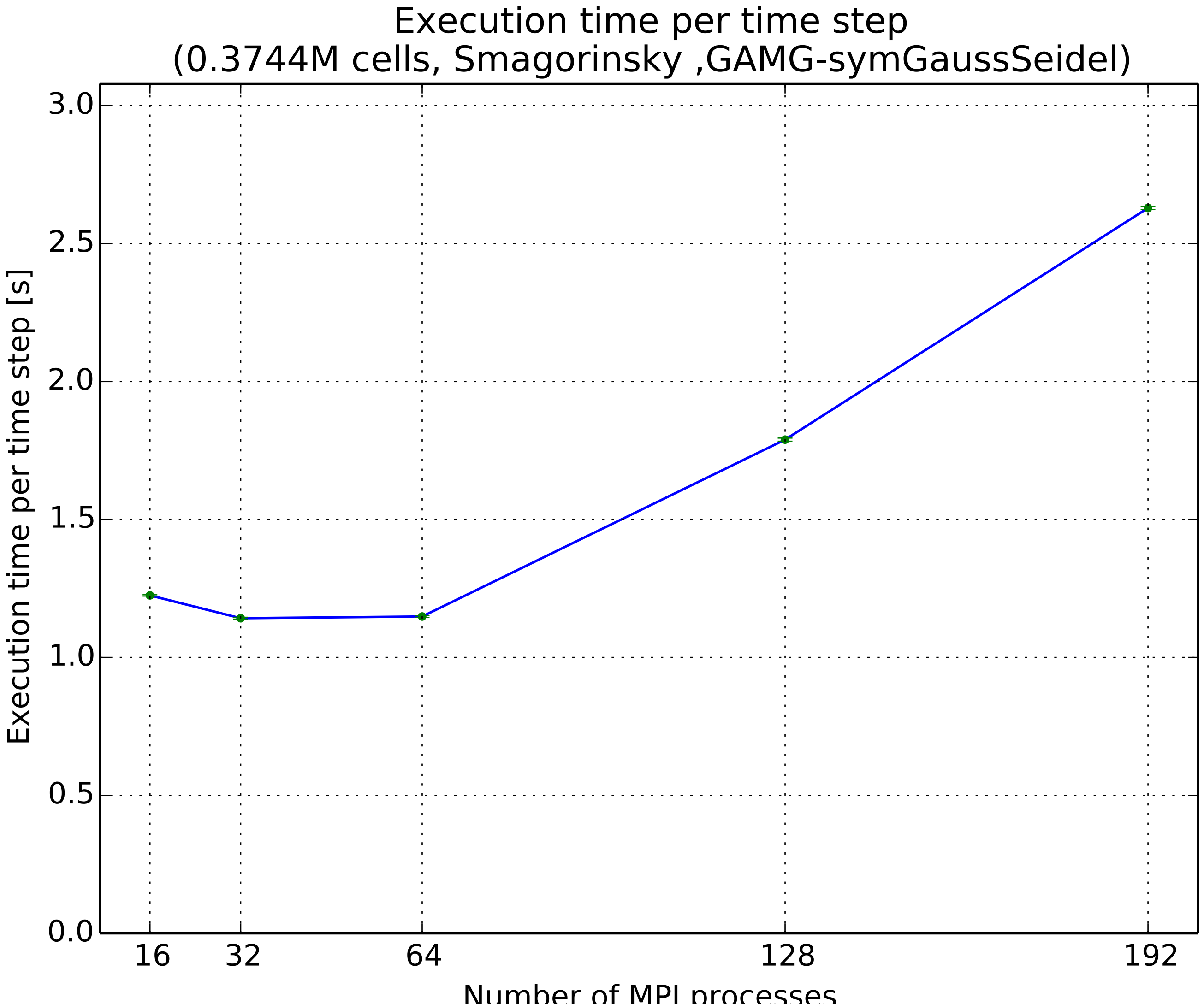

Parallel efficiency
(0.3744M cells, Smagorinsky ,GAMG-GaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes

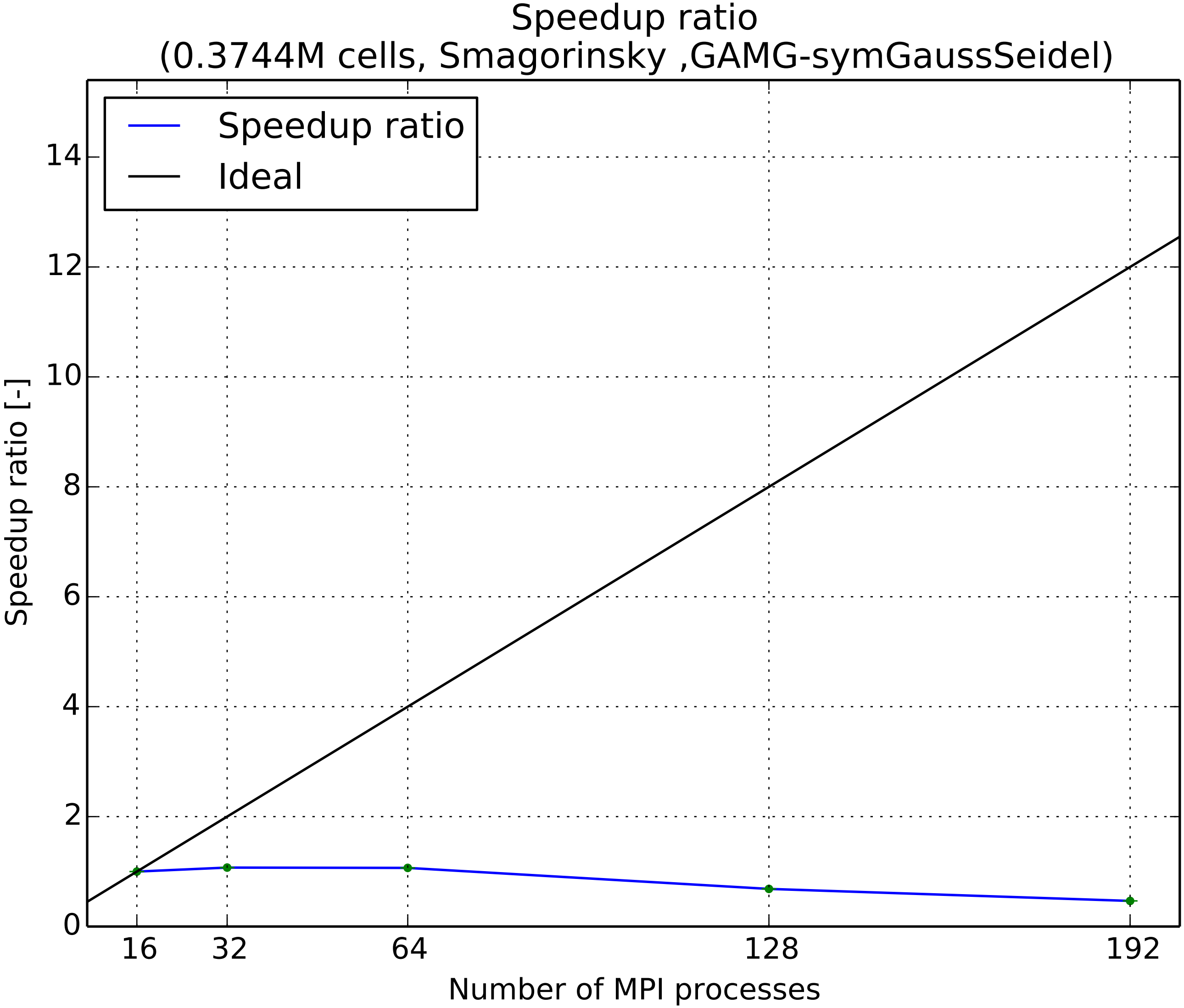

Execution time per time step
(0.3744M cells, Smagorinsky ,GAMG-nonBlockingGaussSeidel)
Execution time per time step [s]
3.0
2.5
2.0
1.5
1.0
0.5
0.0
16
32
64
128
192
Number of MPI processes

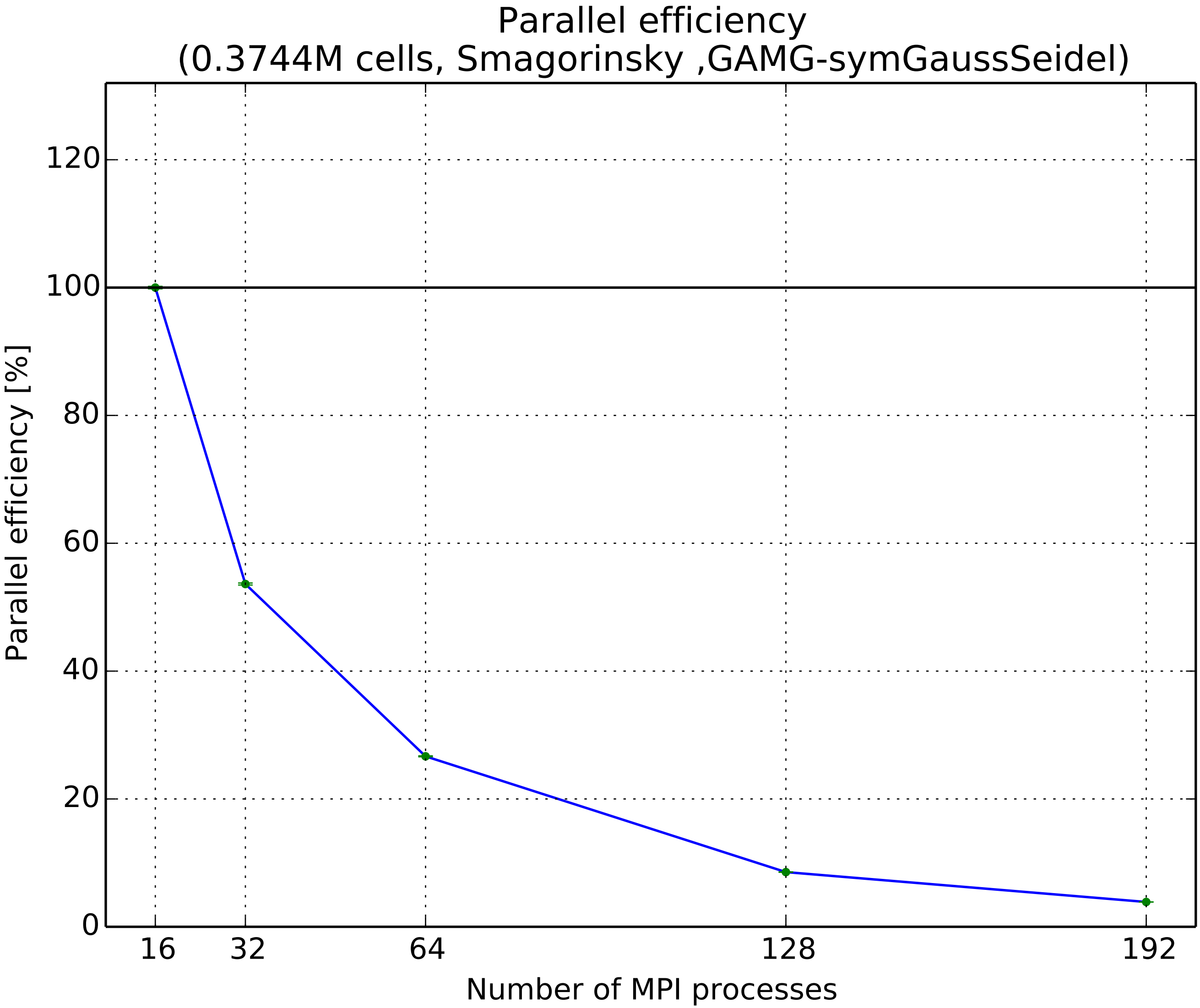

Speedup ratio
(0.3744M cells, Smagorinsky ,GAMG-nonBlockingGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

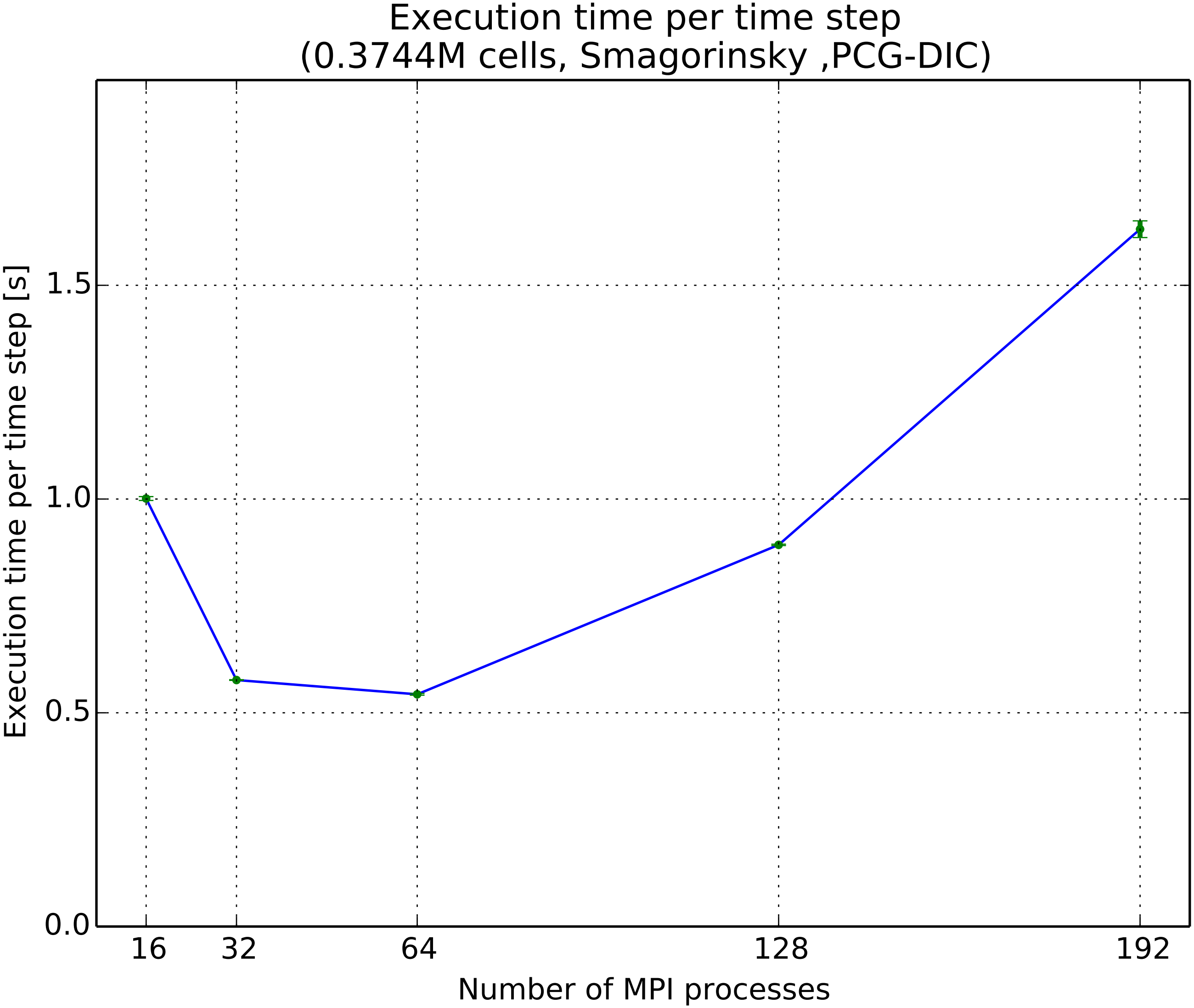


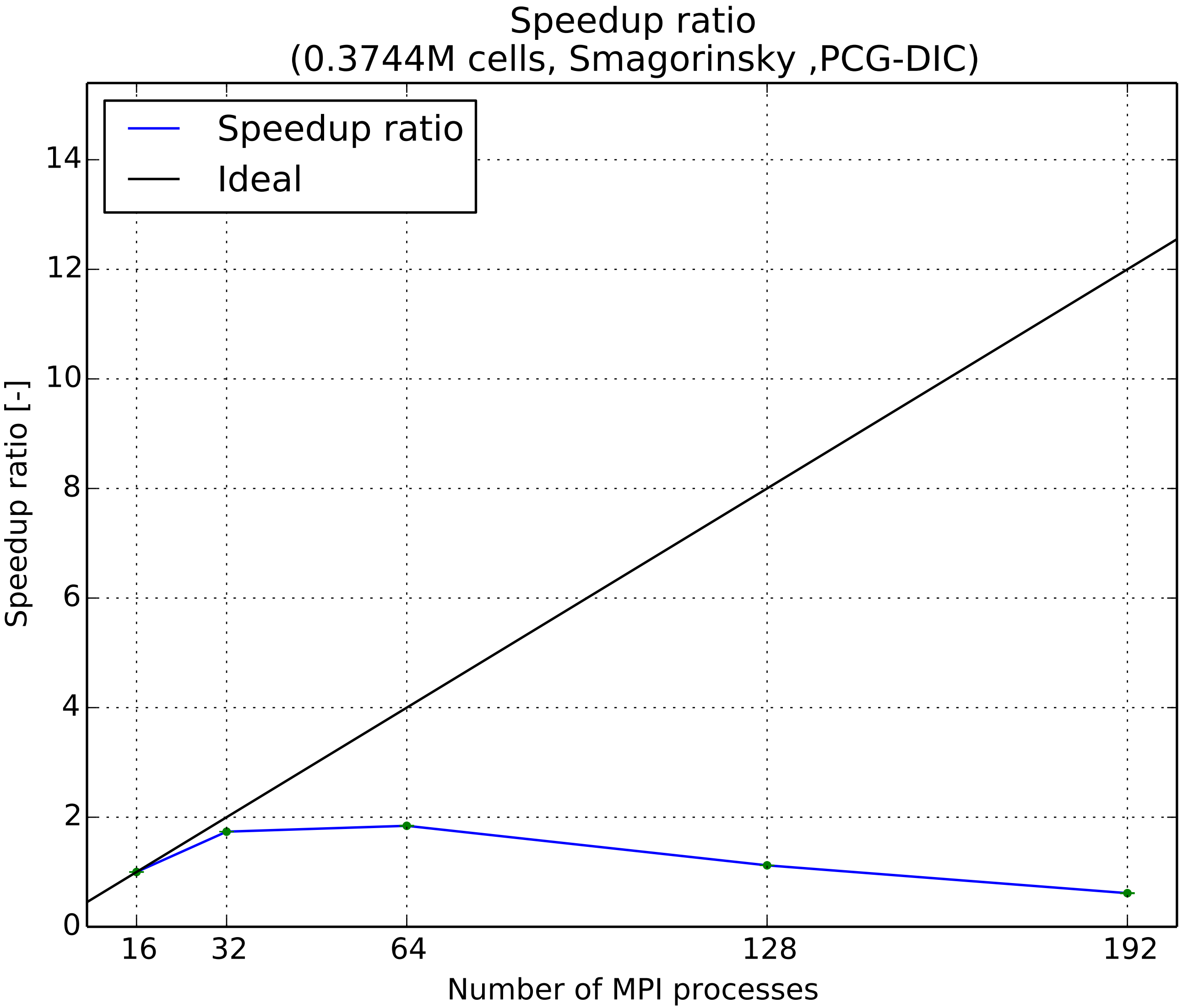
Parallel efficiency
(0.3744M cells, Smagorinsky ,GAMG-nonBlockingGaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes

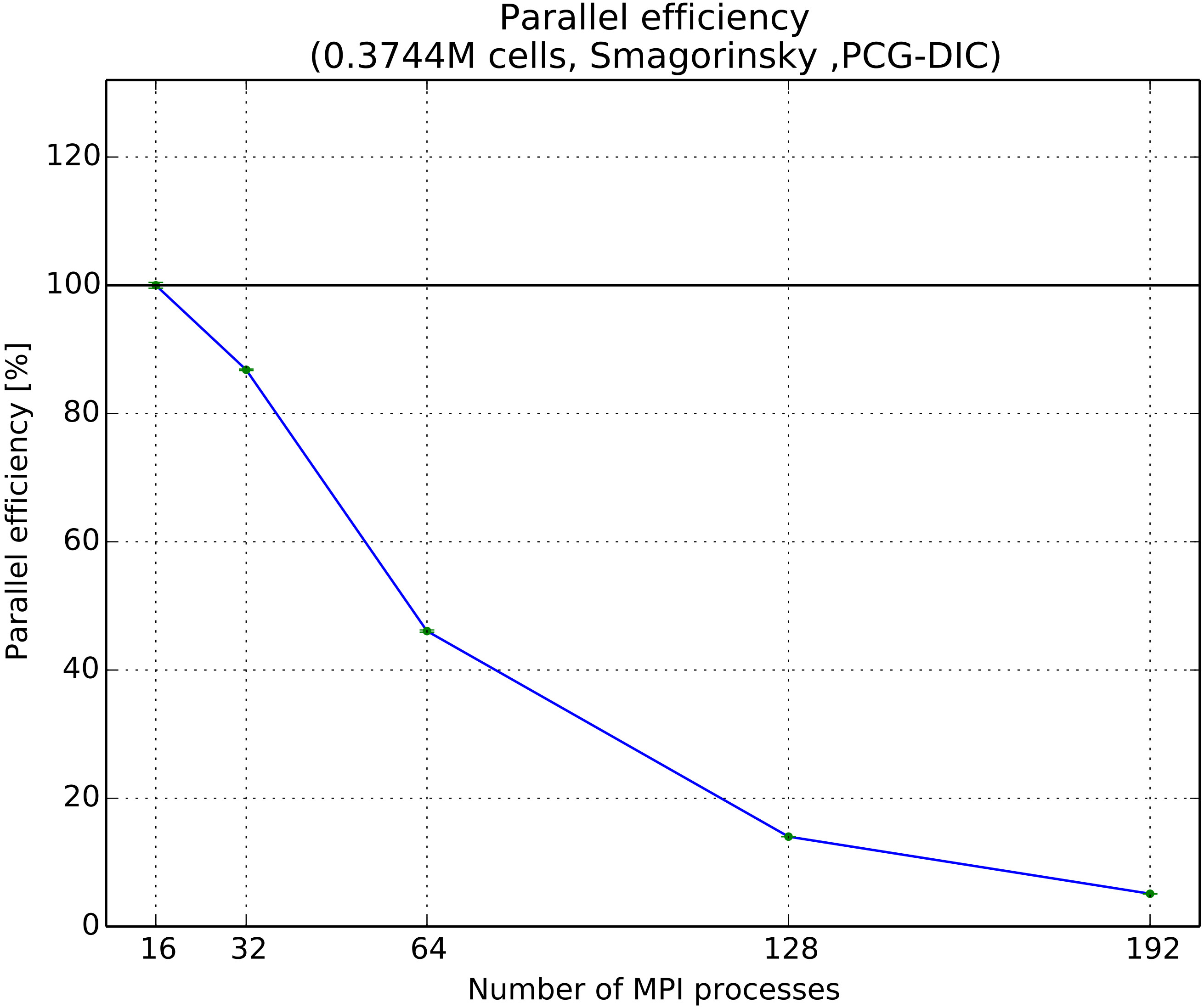

Execution time per time step
(0.3744M cells, Smagorinsky ,GAMG-symGaussSeidel)
Execution time per time step [s]
3.0
2.5
2.0
1.5
1.0
0.5
0.0
16
32
64
128
192
Number of MPI processes

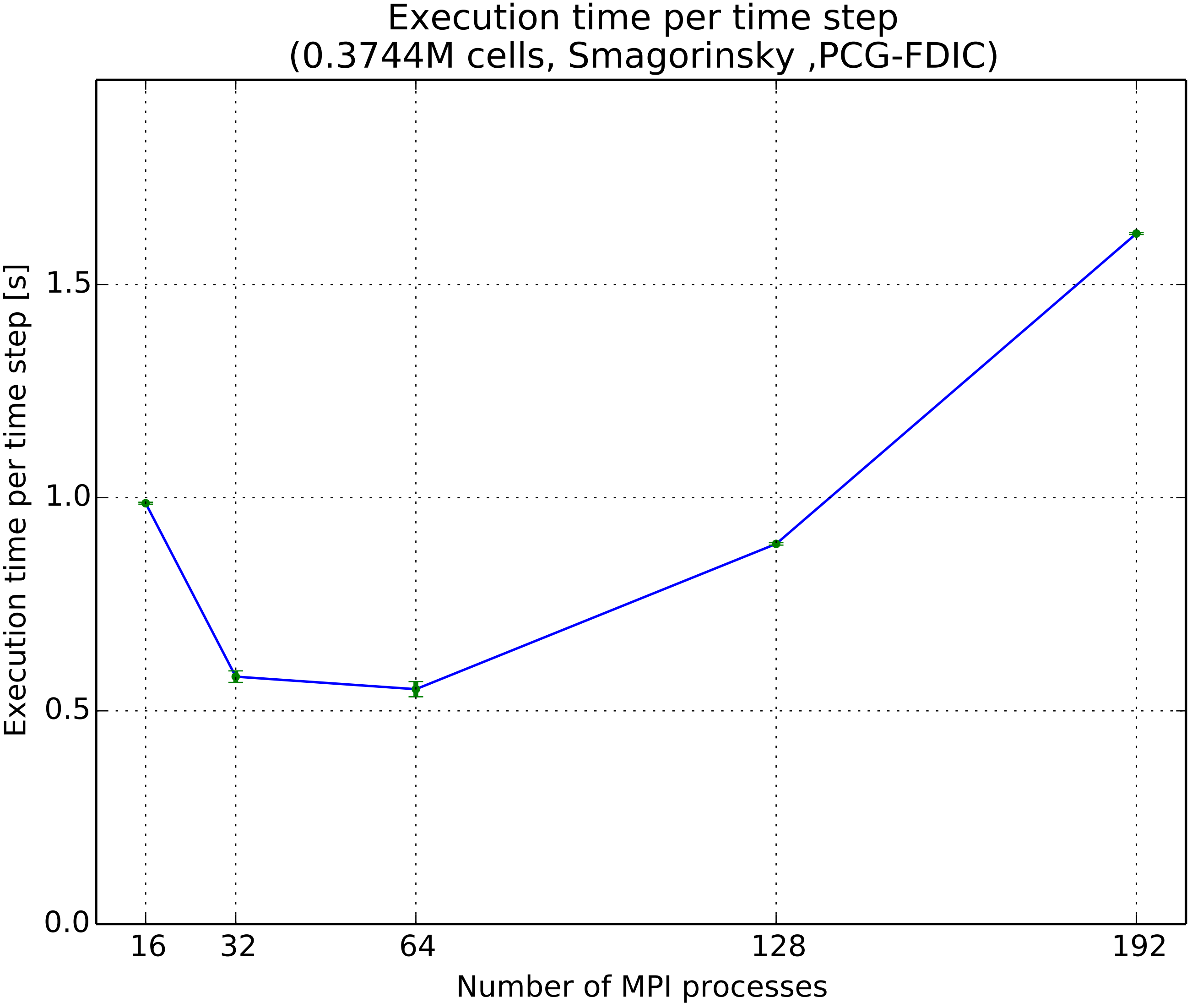

Speedup ratio
(0.3744M cells, Smagorinsky ,GAMG-symGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

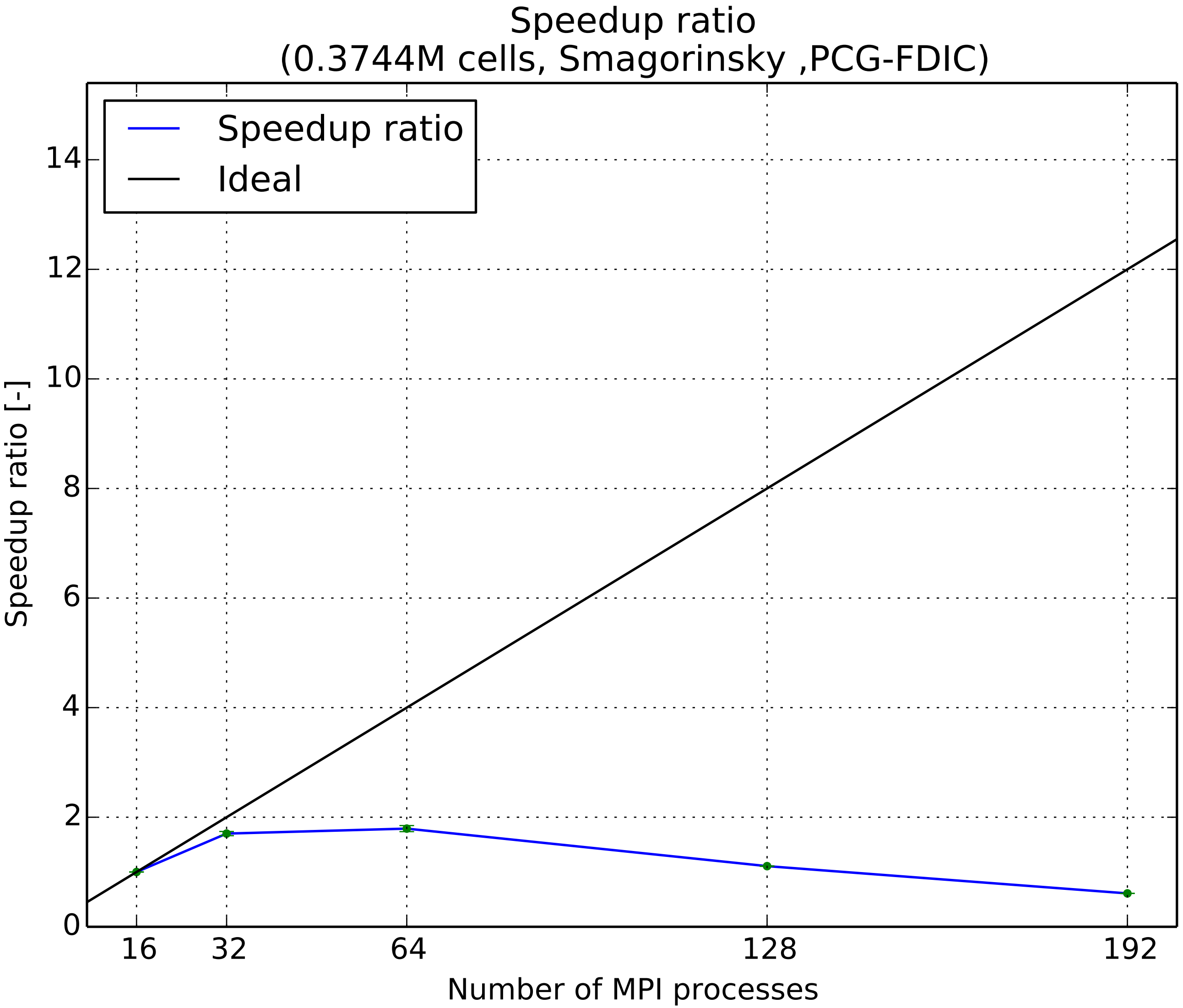

Parallel efficiency
(0.3744M cells, Smagorinsky ,GAMG-symGaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes

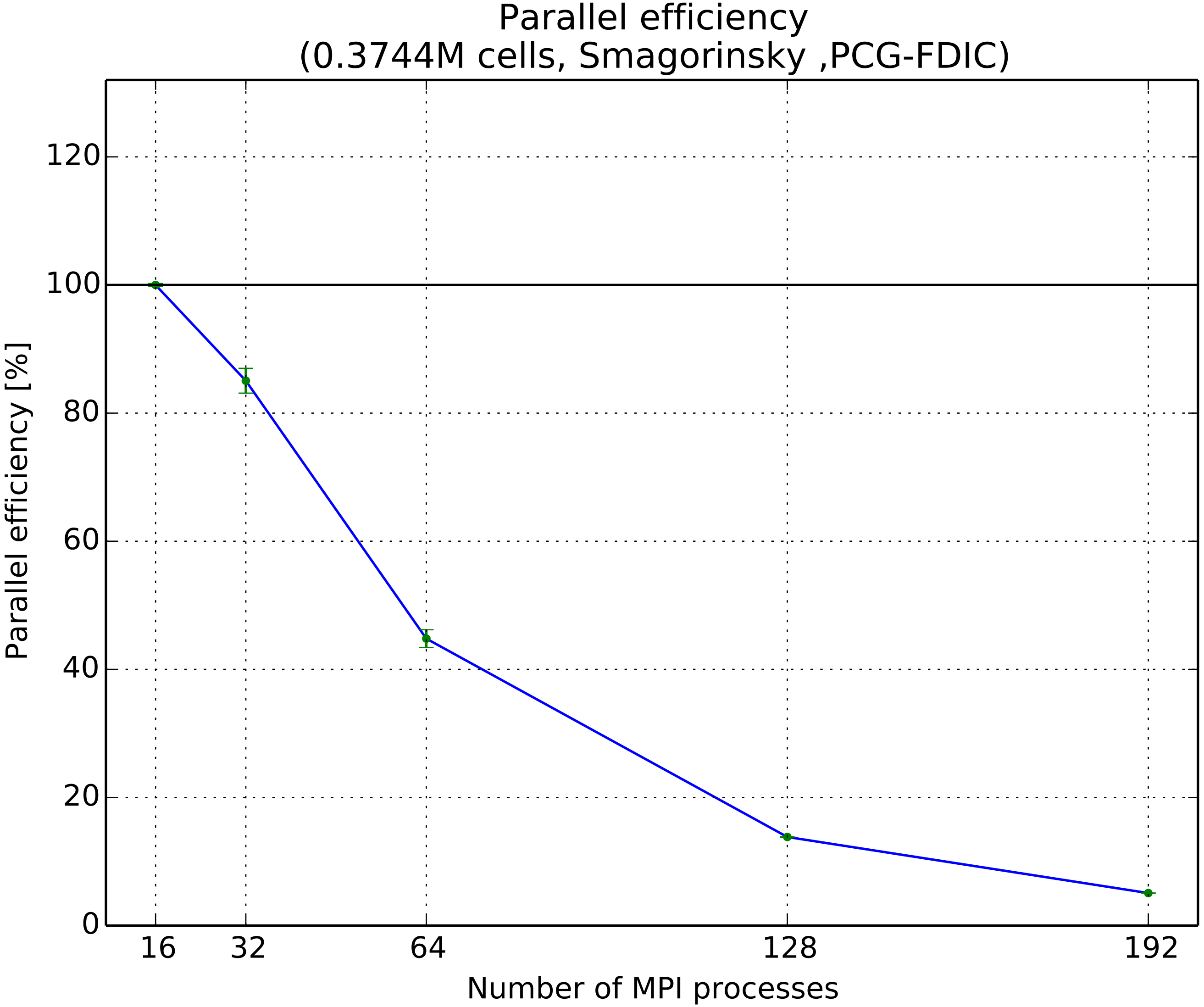

Execution time per time step
(0.3744M cells, Smagorinsky ,PCG-DIC)
Execution time per time step [s]
0.0
0.5
1.0
1.5
16
32
64
128
192
Number of MPI processes

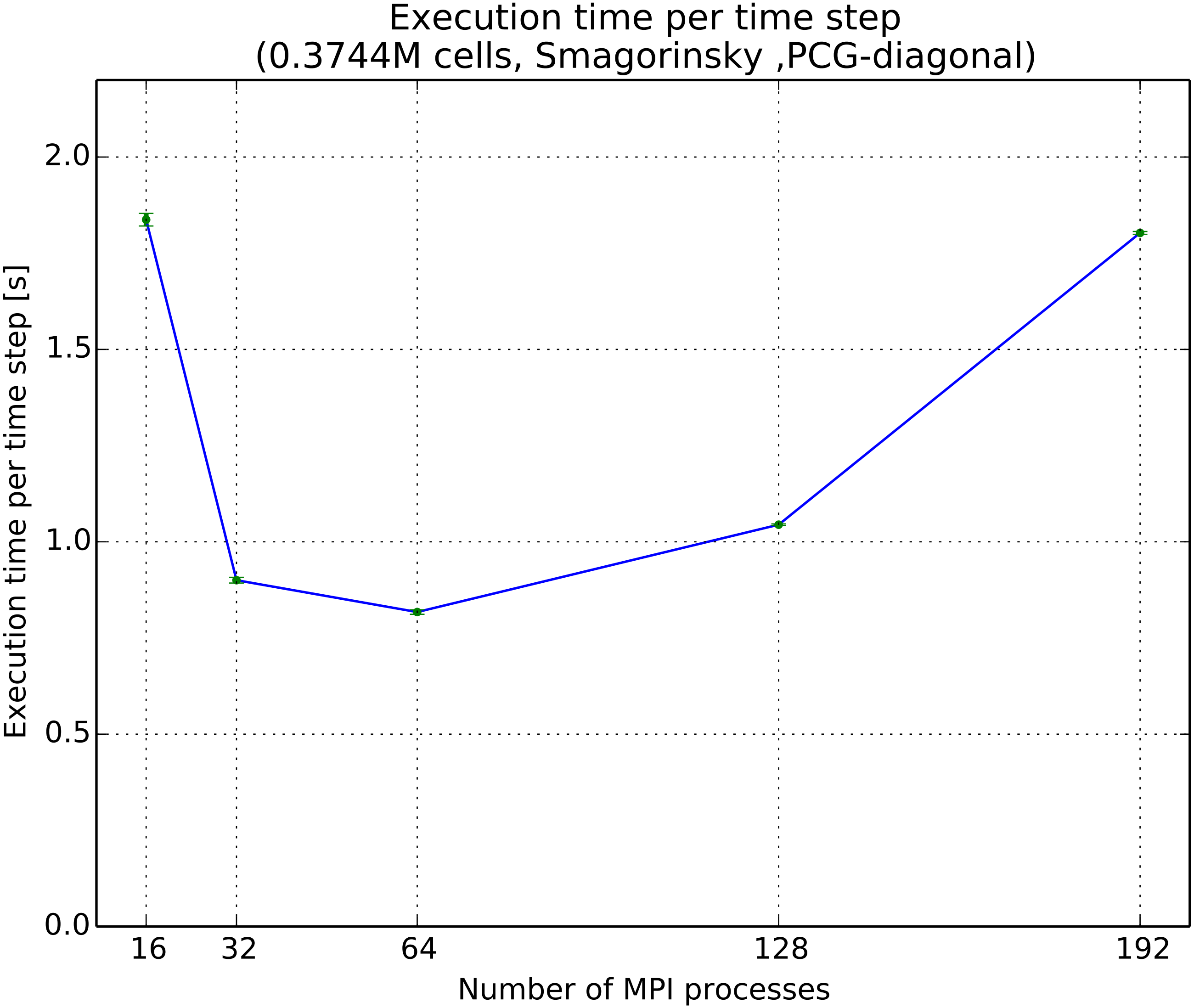

Speedup ratio
(0.3744M cells, Smagorinsky ,PCG-DIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

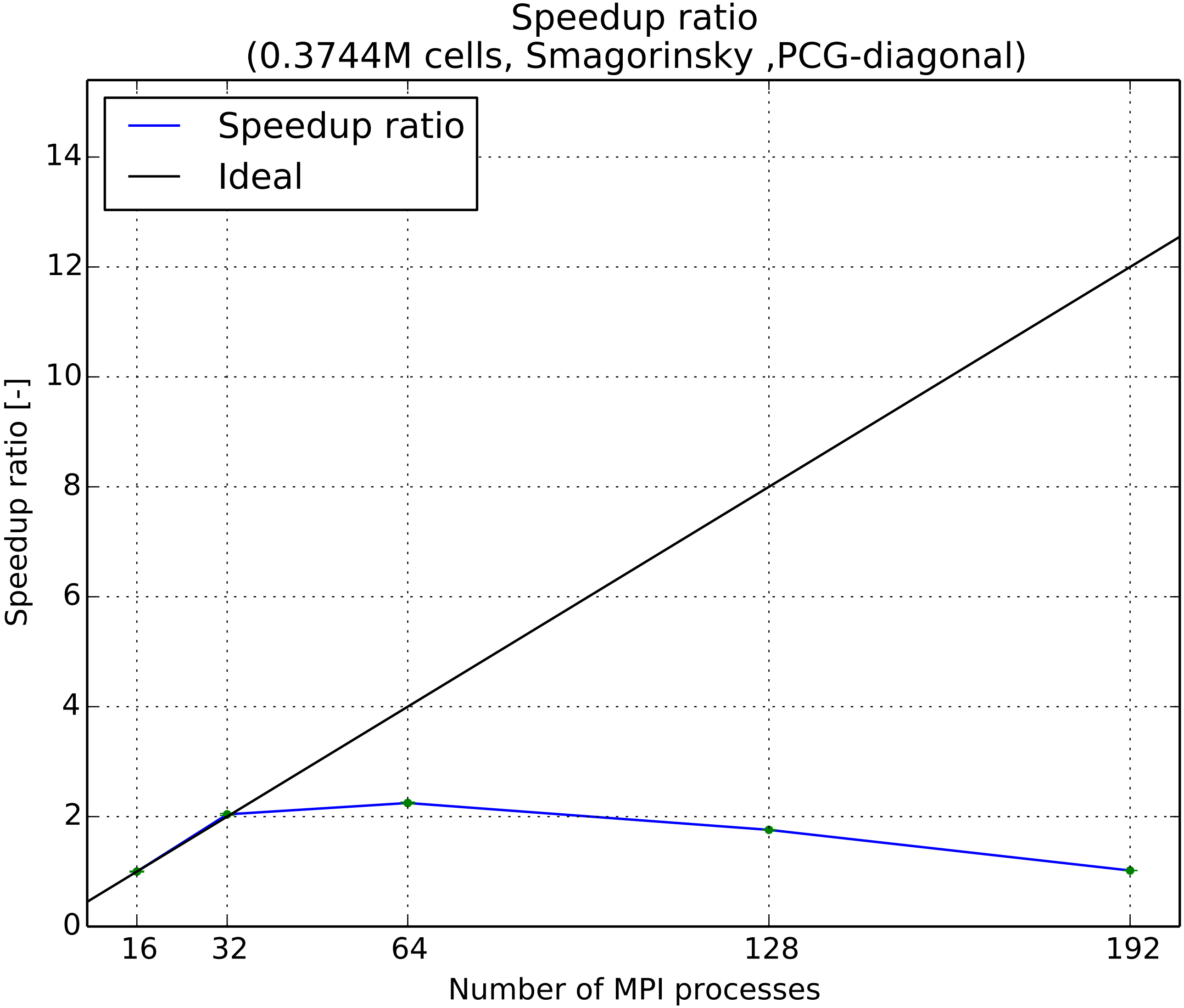

Parallel efficiency
(0.3744M cells, Smagorinsky ,PCG-DIC)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes

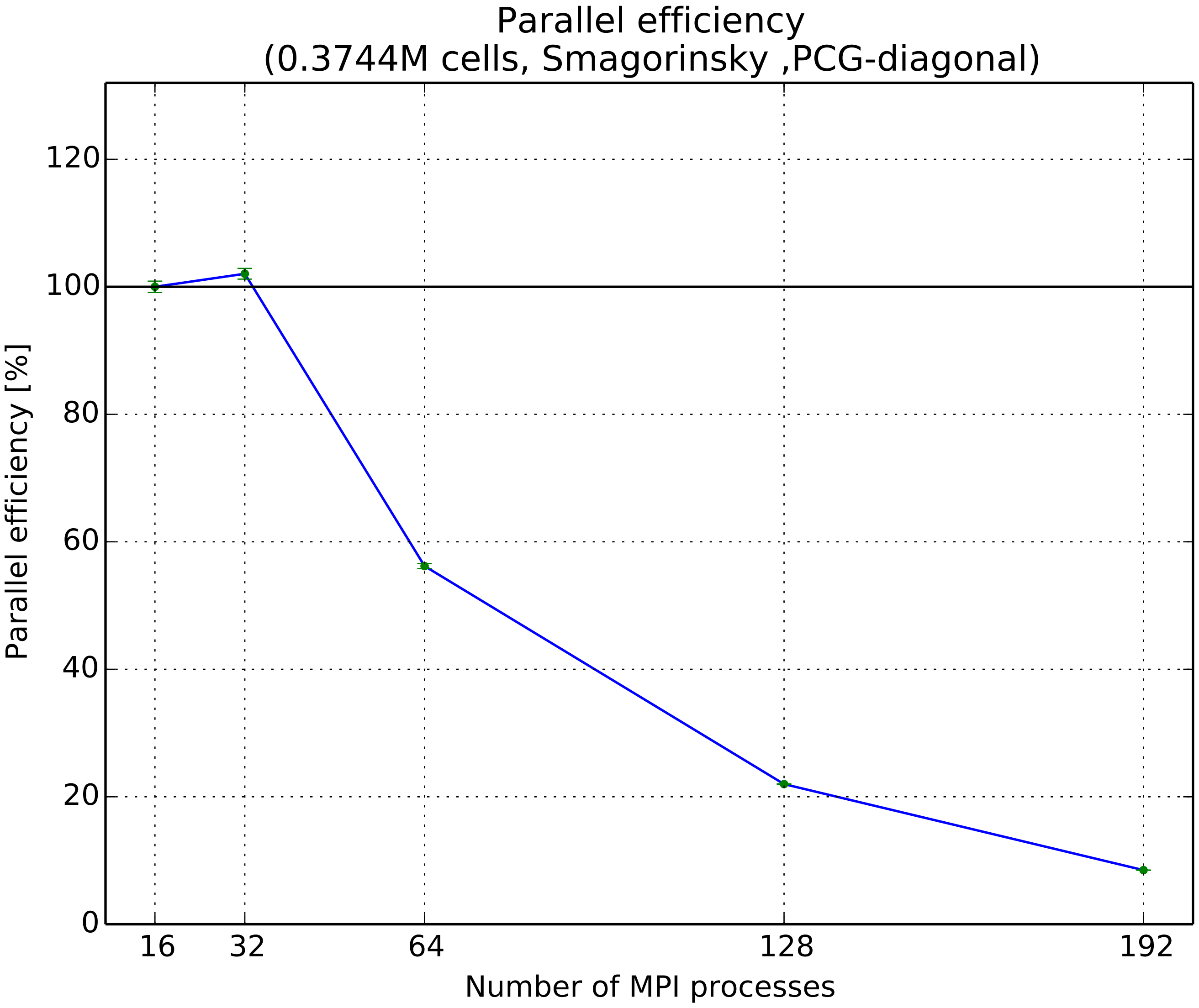

Execution time per time step
(0.3744M cells, Smagorinsky ,PCG-FDIC)
Execution time per time step [s]
0.0
0.5
1.0
1.5
16
32
64
128
192
Number of MPI processes

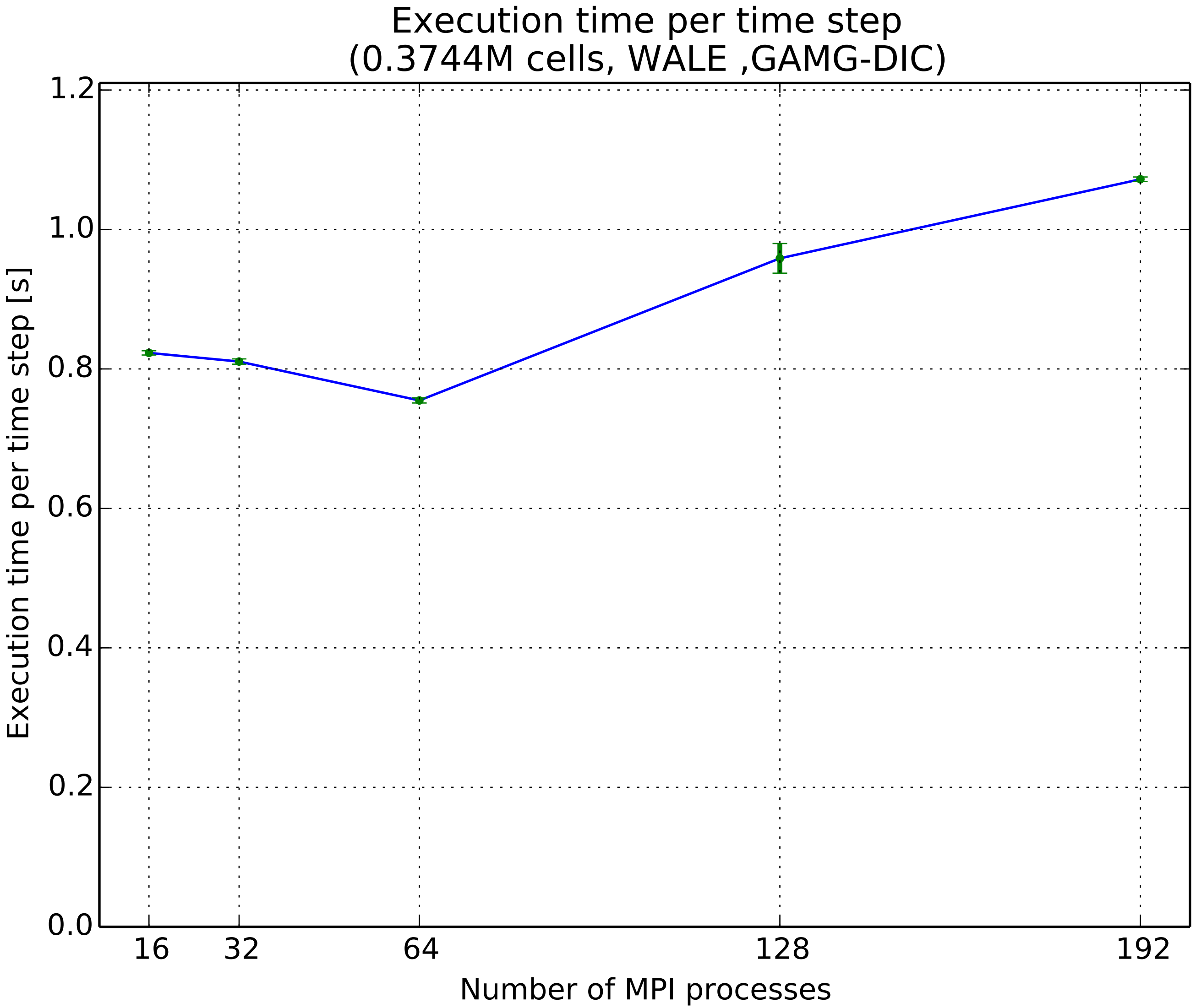

Speedup ratio
(0.3744M cells, Smagorinsky ,PCG-FDIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

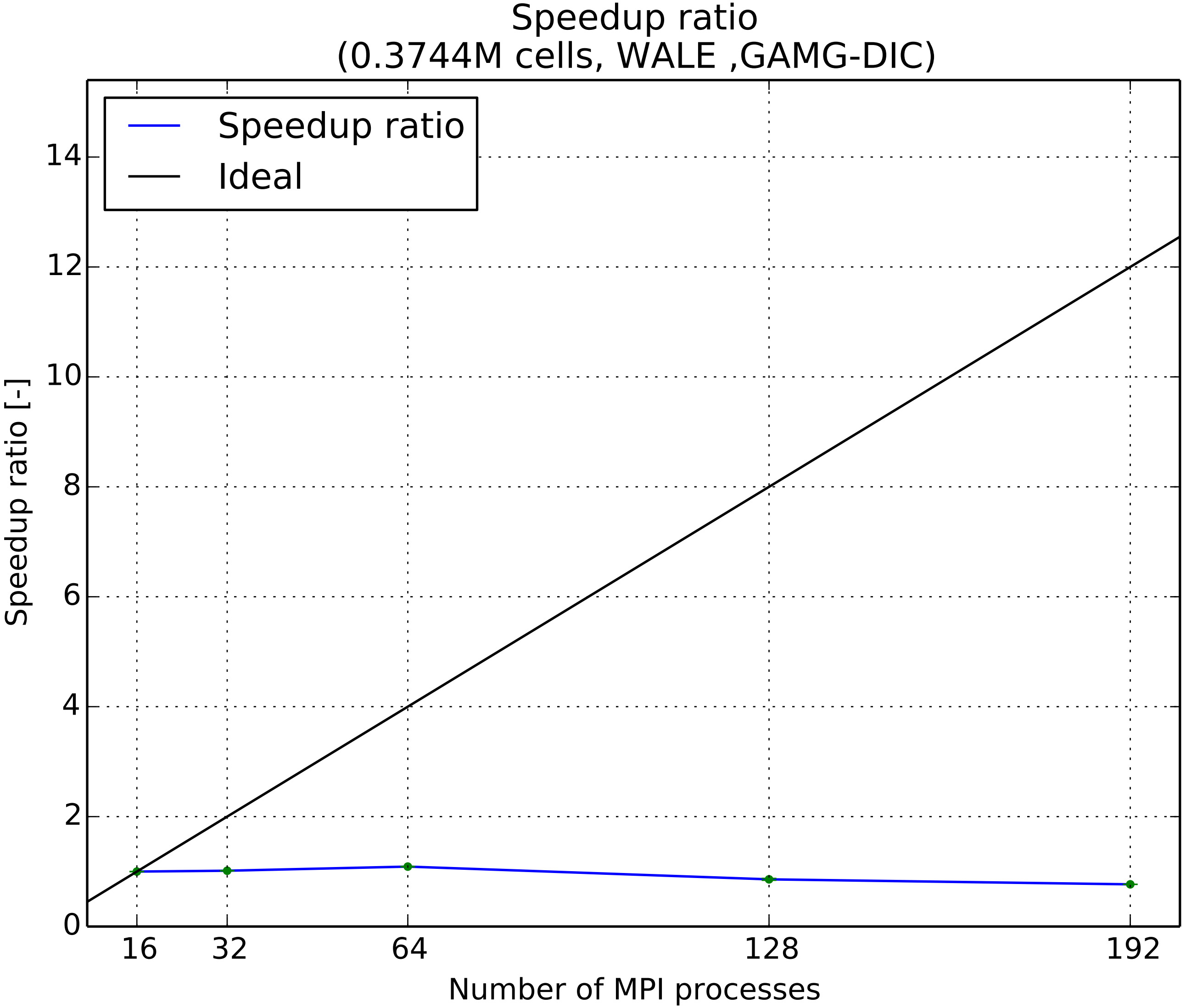

Parallel efficiency
(0.3744M cells, Smagorinsky ,PCG-FDIC)
Parallel efficiency [%]
120
100
80
60
40
20
0
16
32
64
128
192
Number of MPI processes

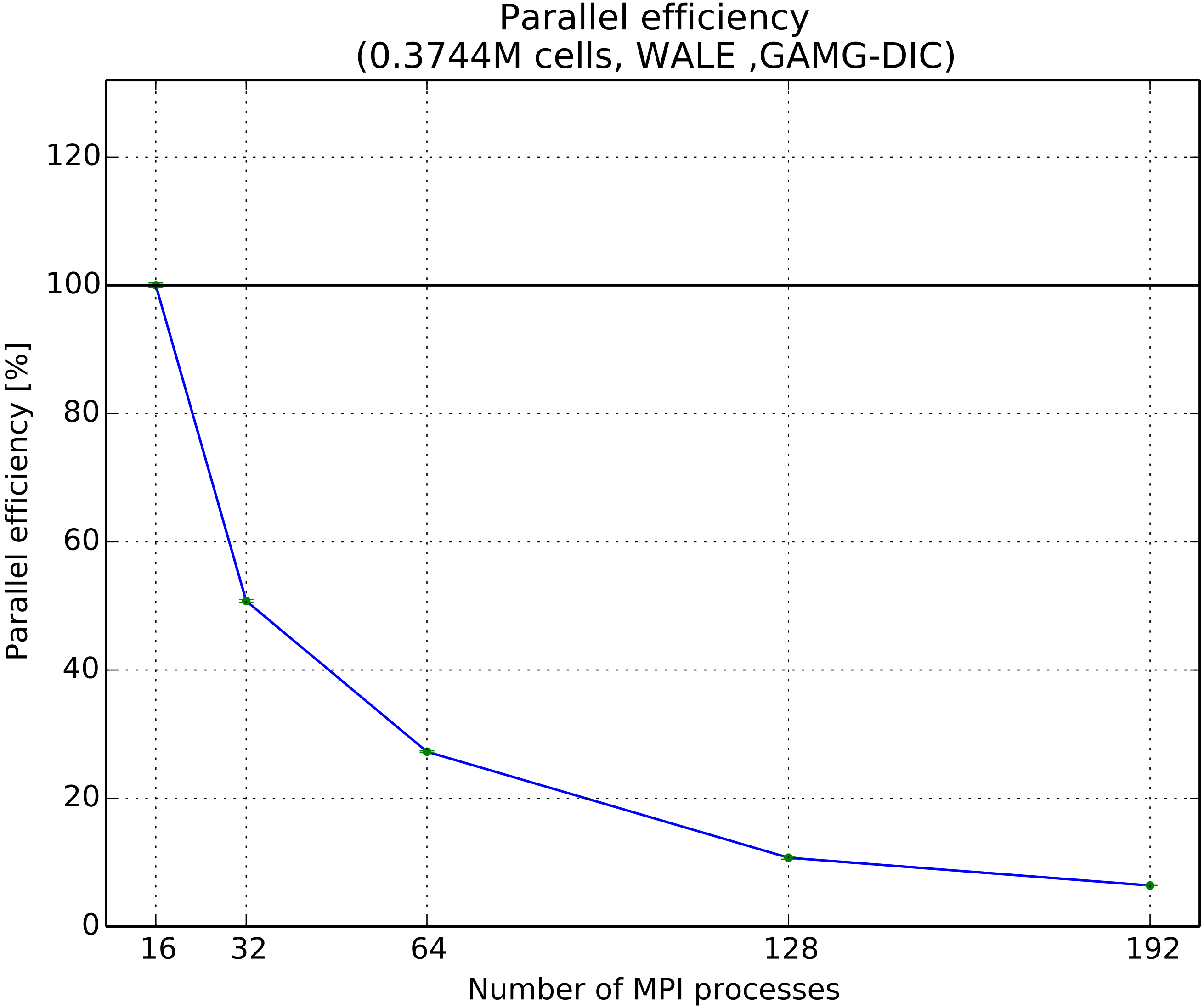

Execution time per time step
(0.3744M cells, Smagorinsky ,PCG-diagonal)
Execution time per time step [s]
Number of MPI processes
0.0
0.5
1.0
1.5
2.0
16
32
64
128
192

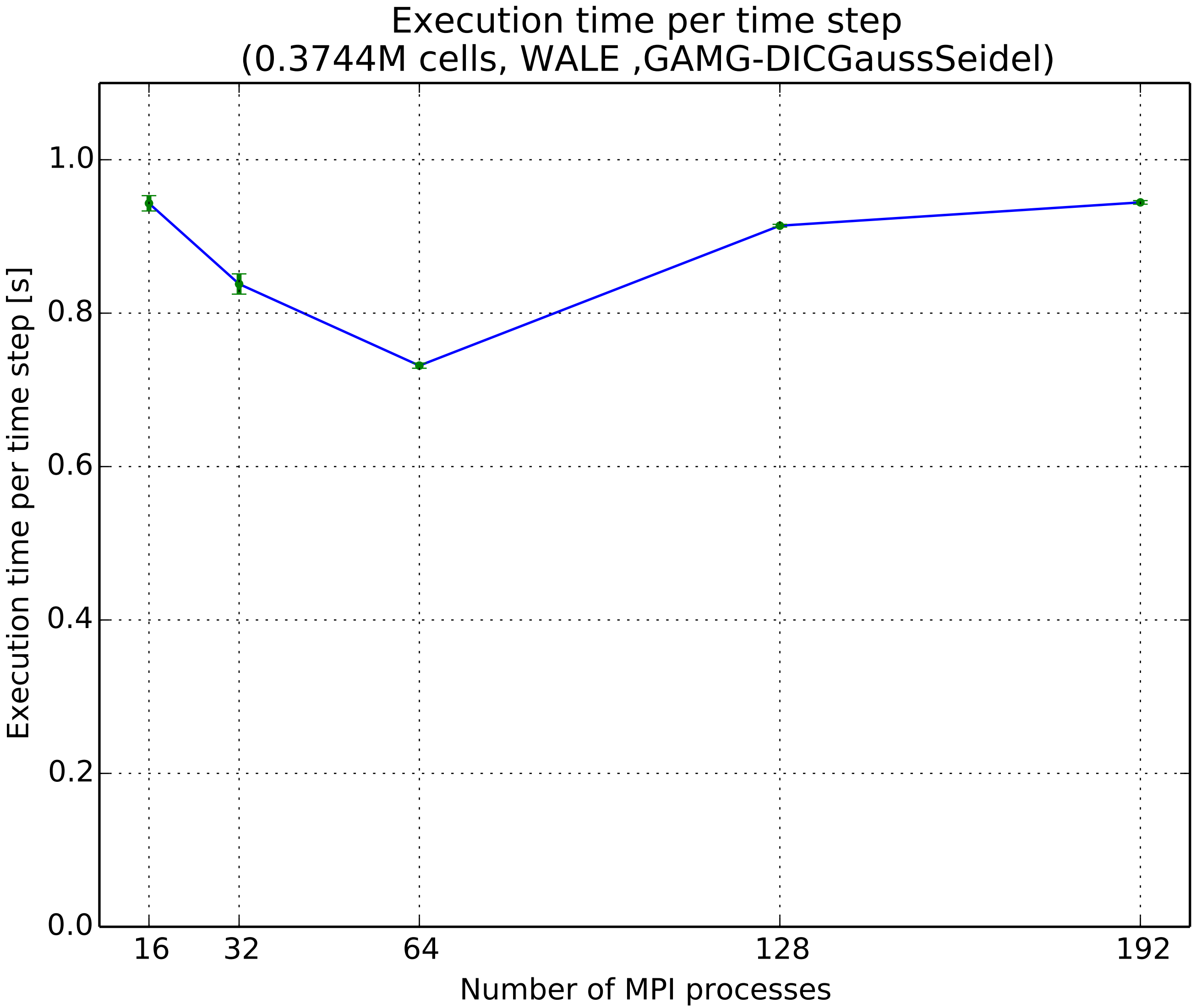

Speedup ratio
(0.3744M cells, Smagorinsky ,PCG-diagonal)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

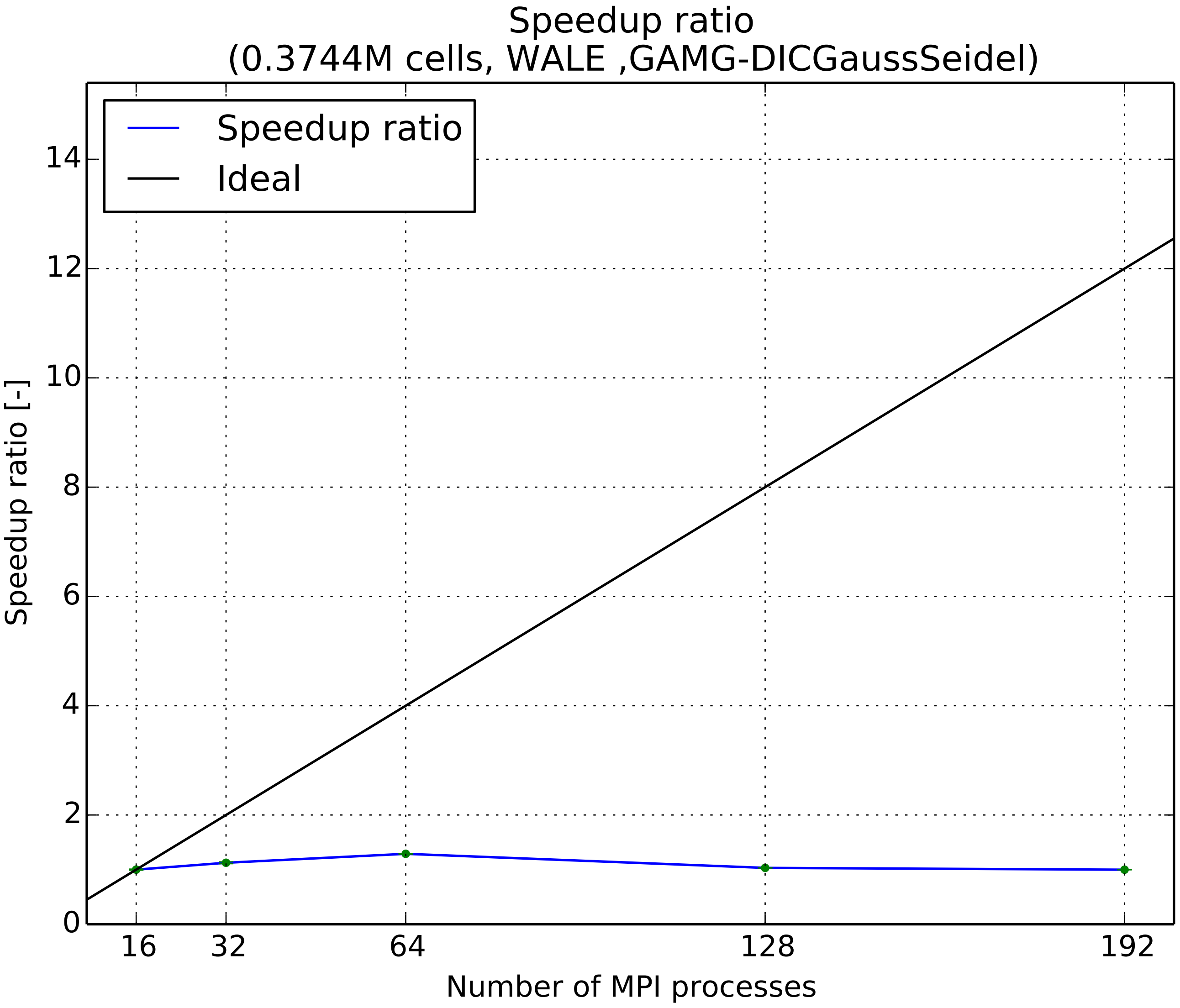

Parallel efficiency
(0.3744M cells, Smagorinsky ,PCG-diagonal)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes

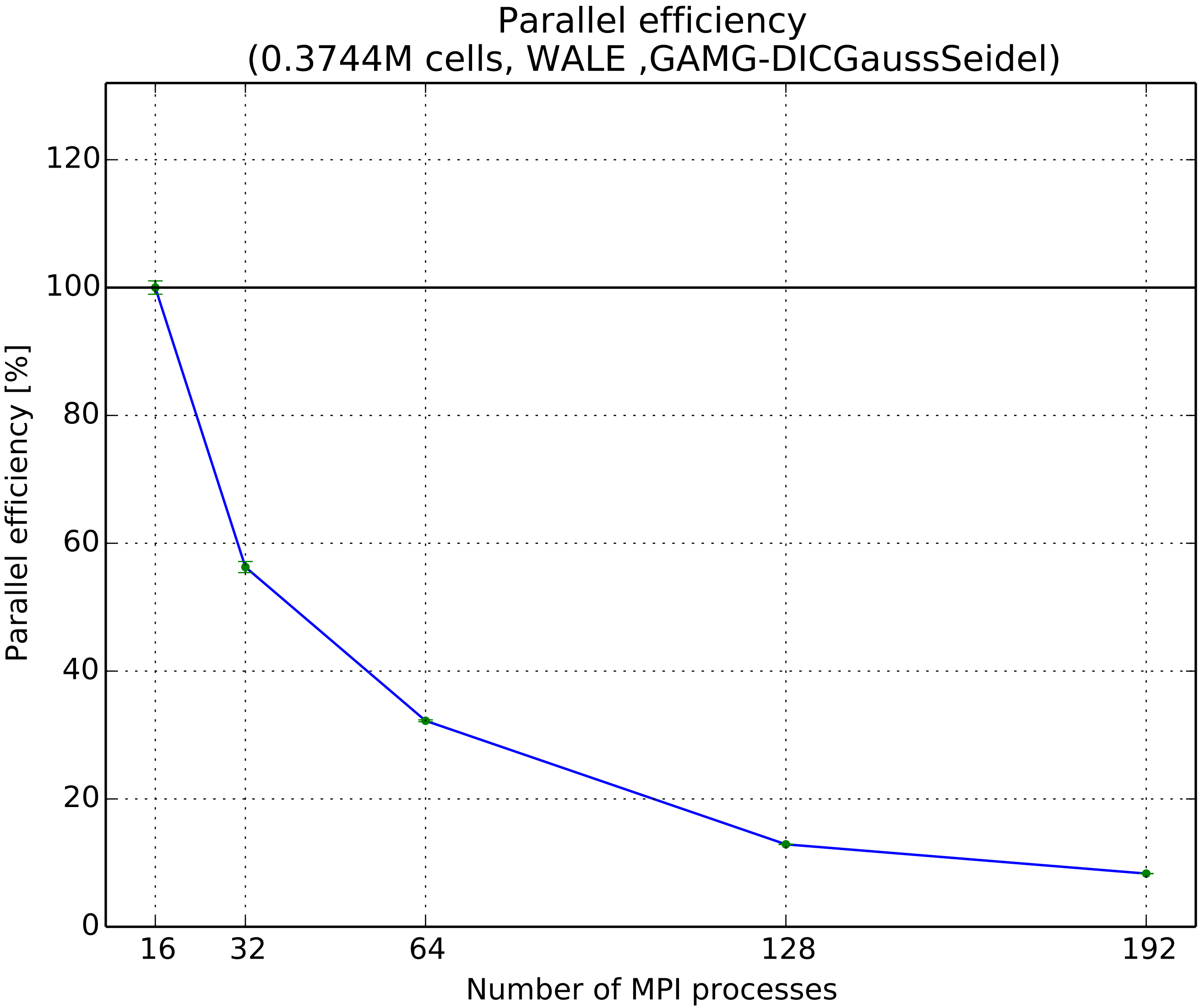

Execution time per time step
(0.3744M cells, WALE ,GAMG-DIC)
Execution time per time step [s]
1.2
1.0
0.8
0.6
0.4
0.2
0.0
16
32
64
128
192
Number of MPI processes

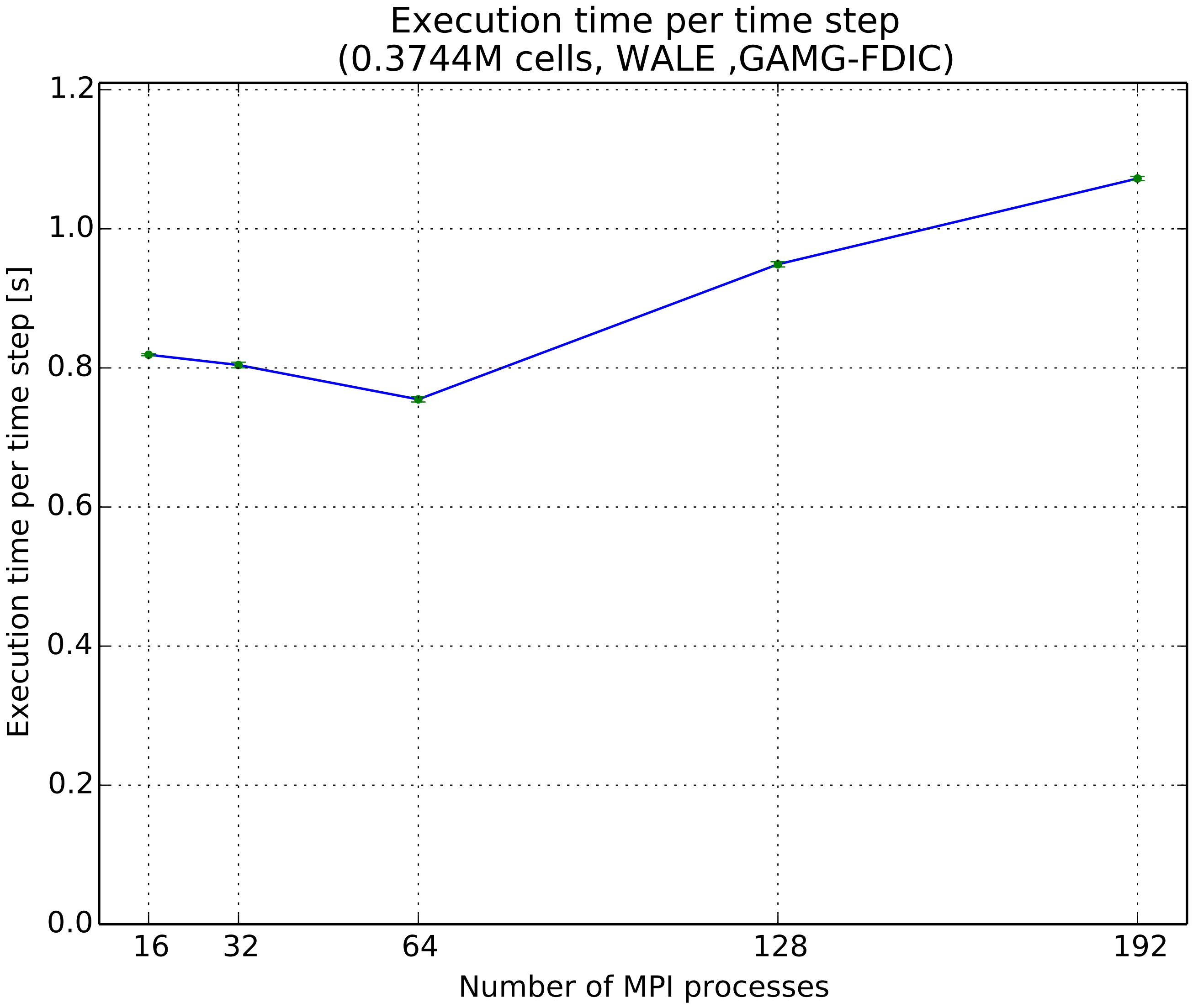

Speedup ratio
(0.3744M cells, WALE ,GAMG-DIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

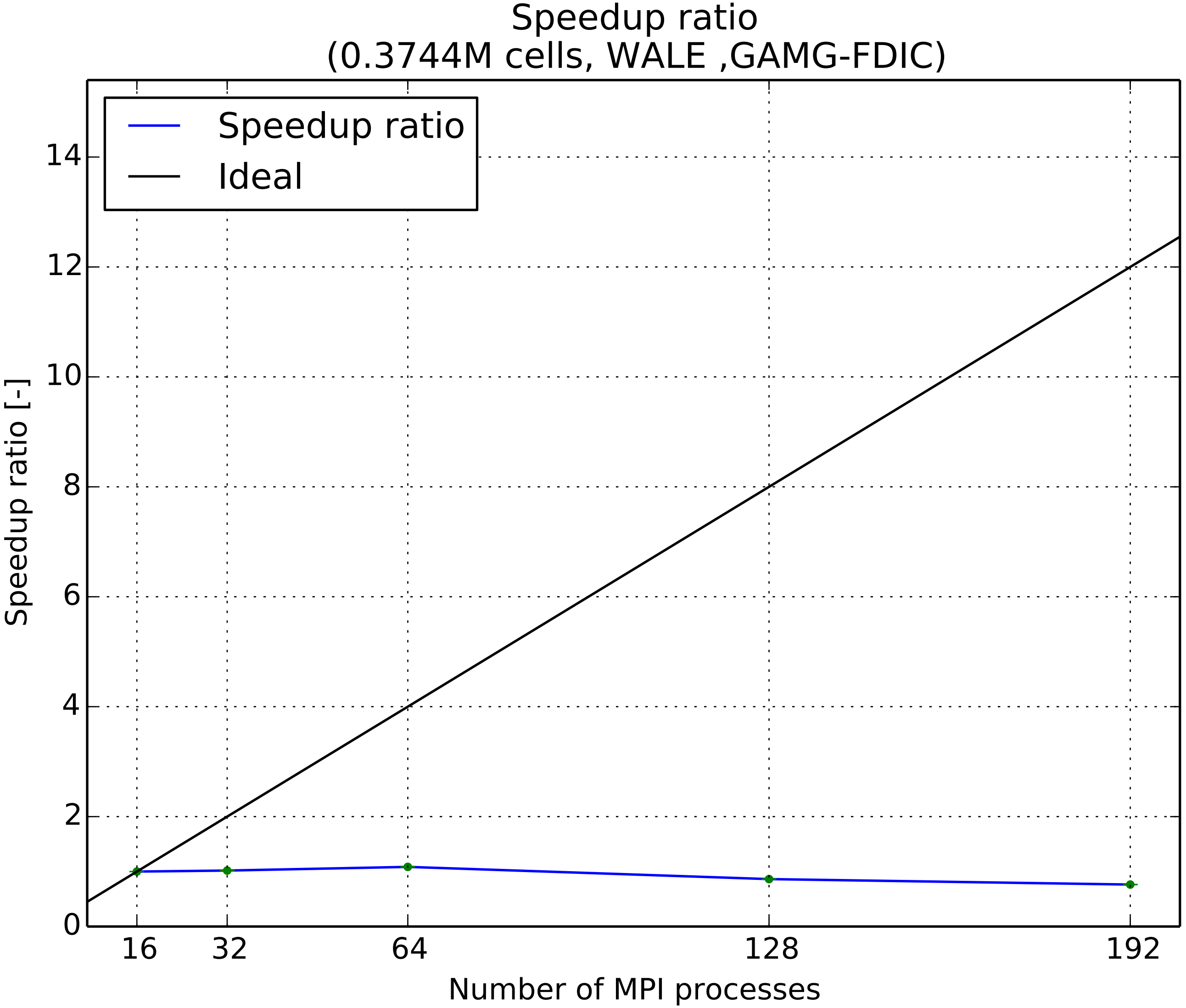

Parallel efficiency
(0.3744M cells, WALE ,GAMG-DIC)
Parallel efficiency [%]
120
100
80
60
40
20
0
16
32
64
128
192
Number of MPI processes

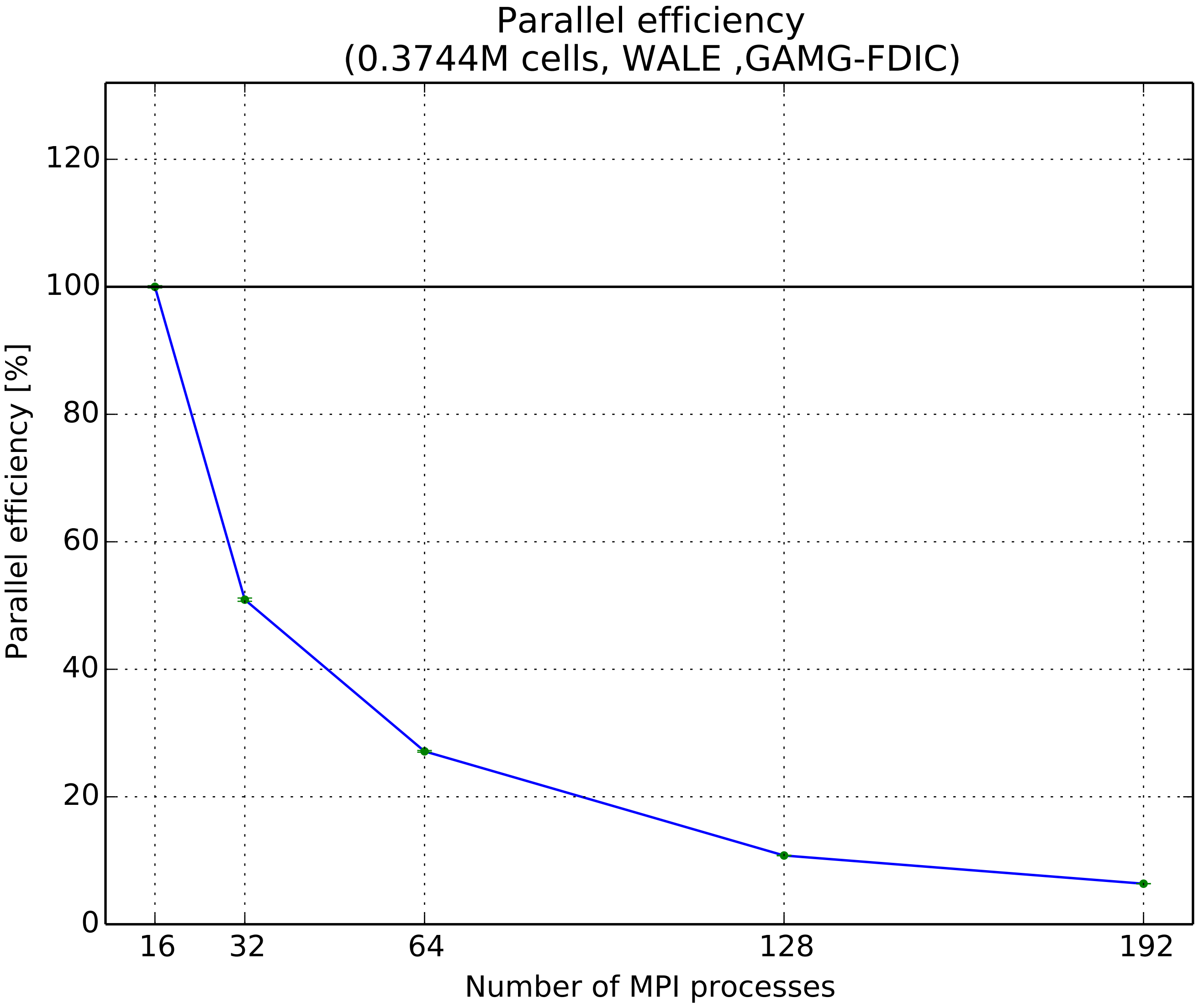

Execution time per time step
(0.3744M cells, WALE ,GAMG-DICGaussSeidel)
Execution time per time step [s]
1.0
0.8
0.6
0.4
0.2
0.0
16
32
64
128
192
Number of MPI processes


Speedup ratio
(0.3744M cells, WALE ,GAMG-DICGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

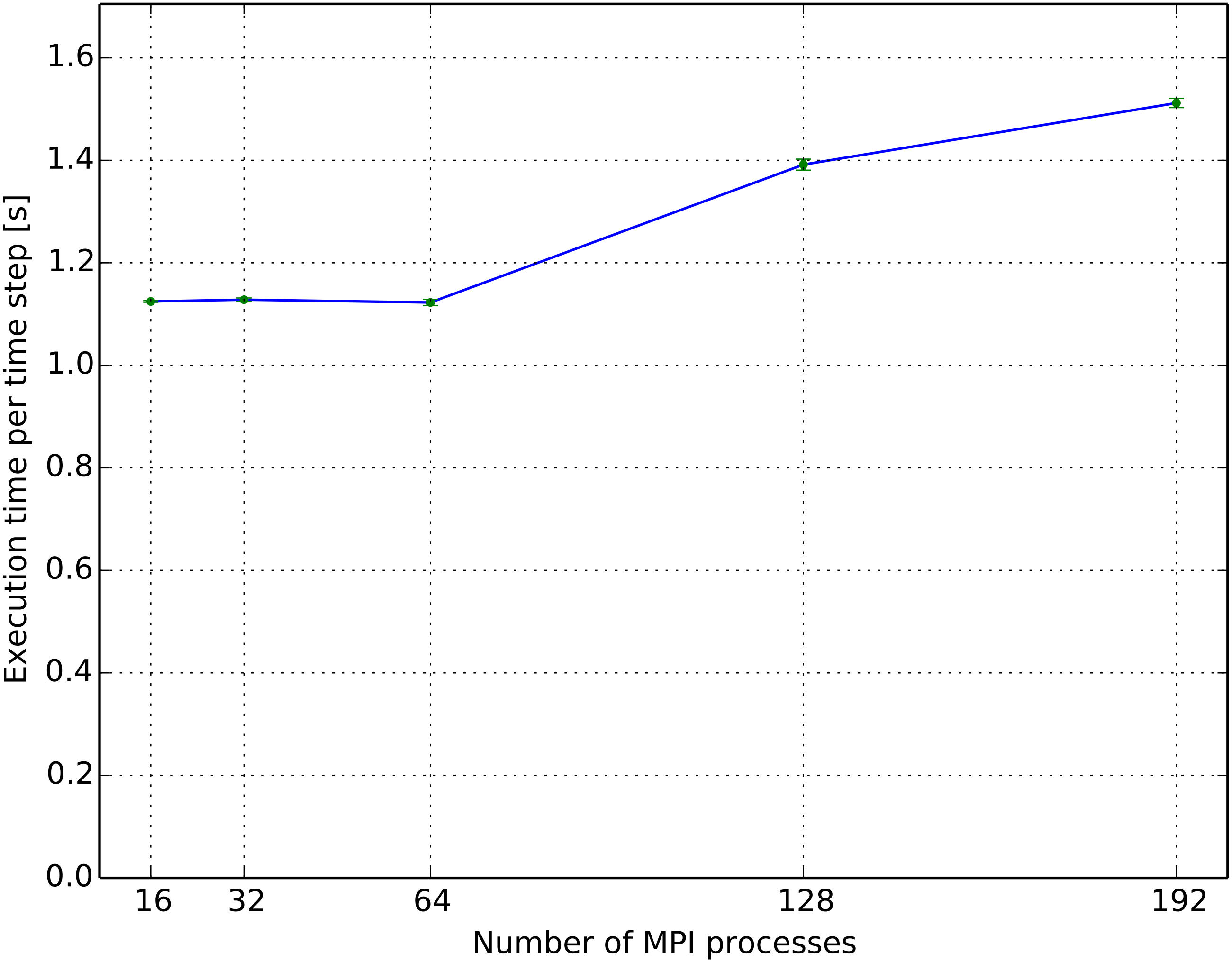

Parallel efficiency
(0.3744M cells, WALE ,GAMG-DICGaussSeidel)
Parallel efficiency [%]
120
100
80
60
40
20
0
16
32
64
128
192
Number of MPI processes

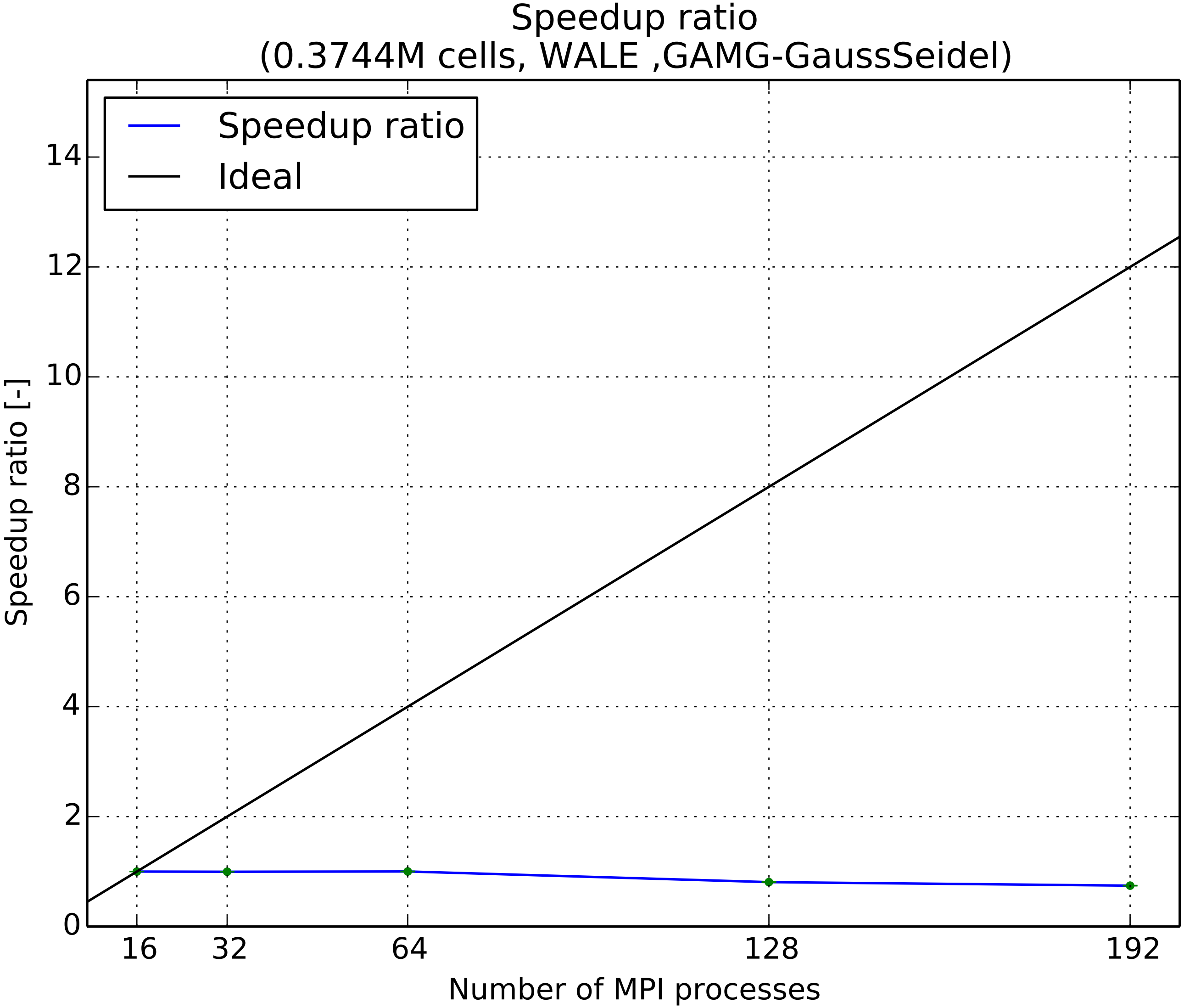

Execution time per time step
(0.3744M cells, WALE ,GAMG-FDIC)
Execution time per time step [s]
0.0
0.2
0.4
0.6
0.8
1.0
1.2
16
32
64
128
192
Number of MPI processes

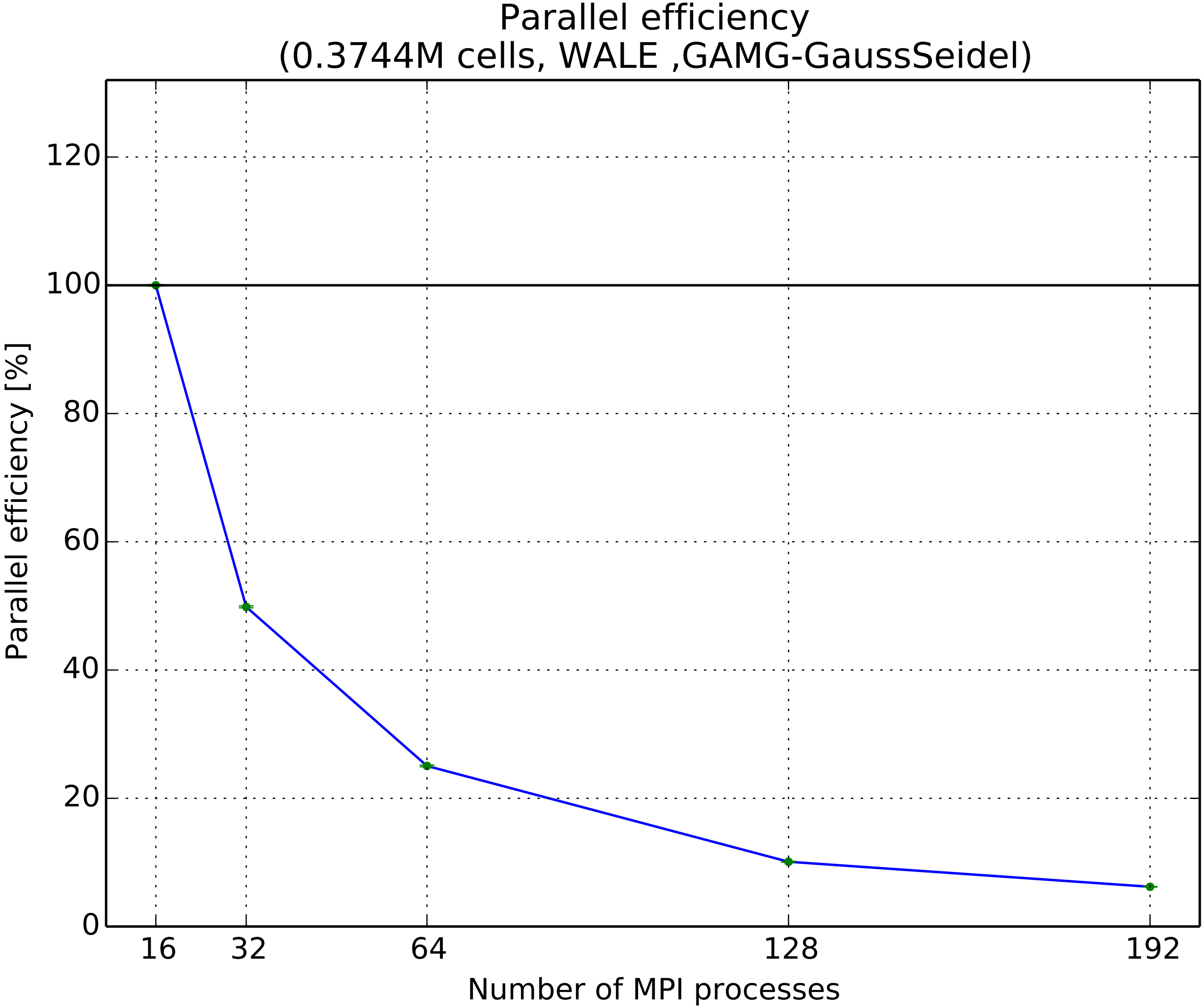

Speedup ratio
(0.3744M cells, WALE ,GAMG-FDIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

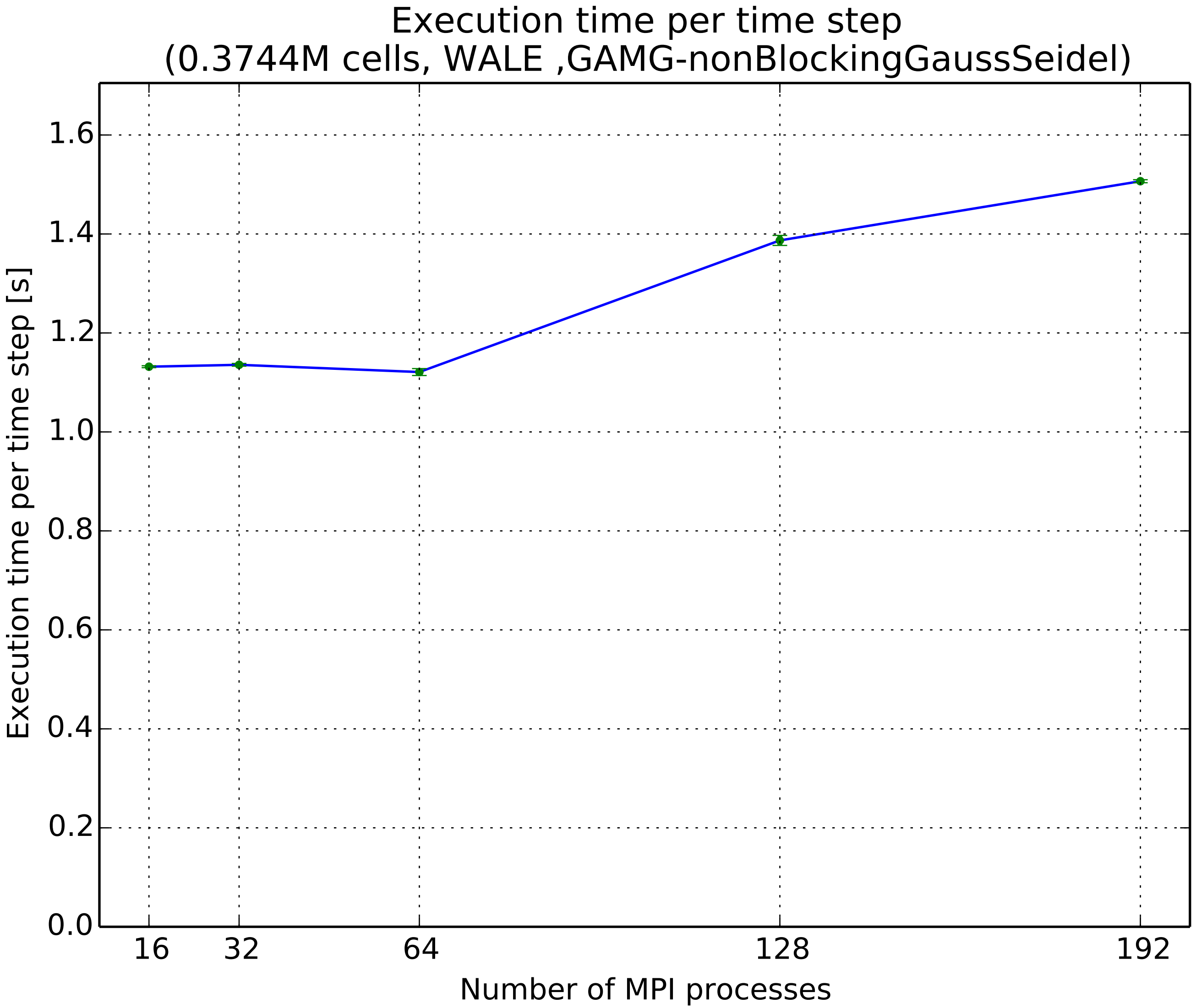

Parallel efficiency
(0.3744M cells, WALE ,GAMG-FDIC)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes

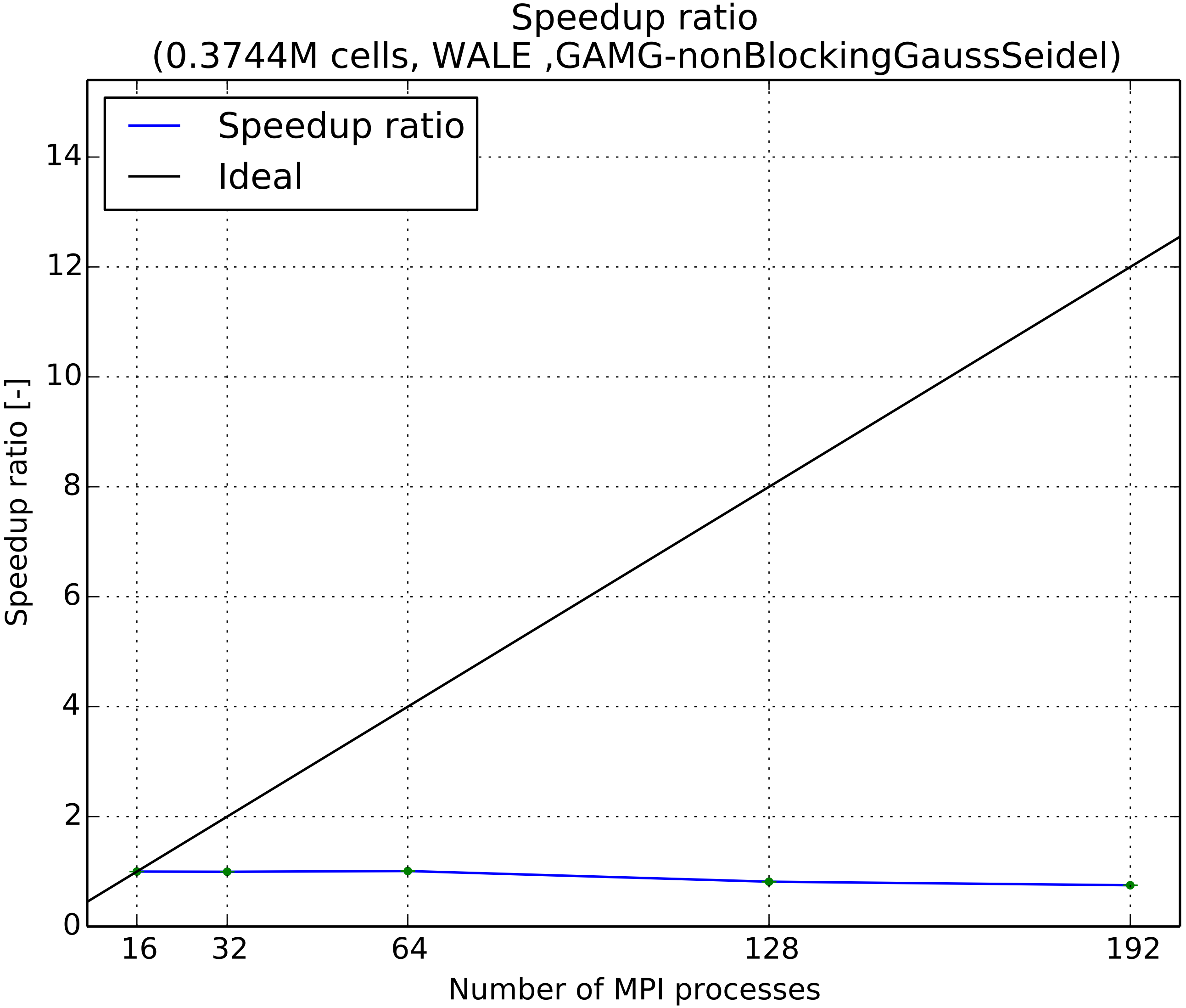
Execution time per time step
(0.3744M cells, WALE ,GAMG-GaussSeidel)




Speedup ratio
(0.3744M cells, WALE ,GAMG-GaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes


Parallel efficiency
(0.3744M cells, WALE ,GAMG-GaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes


Execution time per time step
(0.3744M cells, WALE ,GAMG-nonBlockingGaussSeidel)
Execution time per time step [s]
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
16
32
64
128
192
Number of MPI processes


Speedup ratio
(0.3744M cells, WALE ,GAMG-nonBlockingGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
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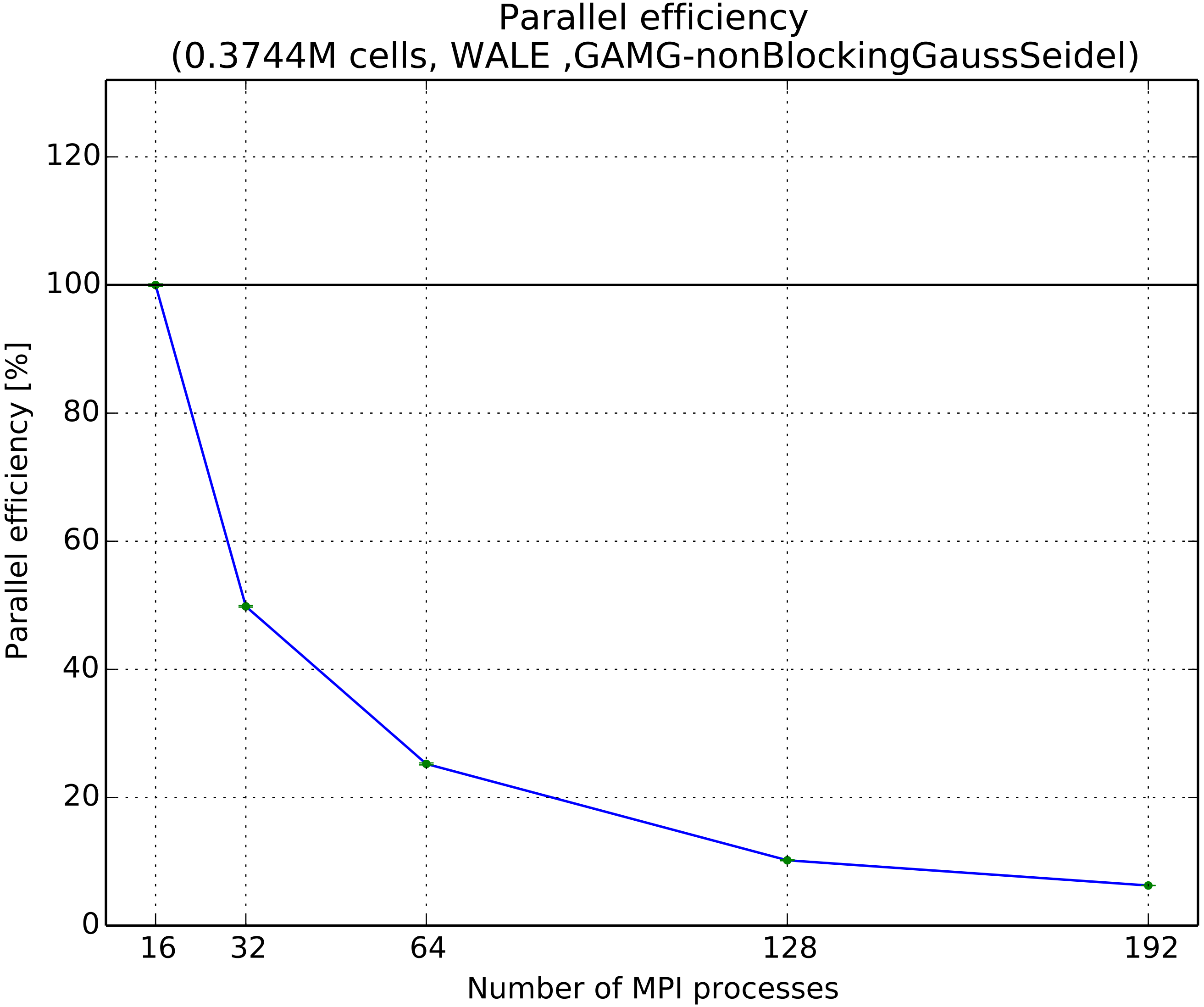
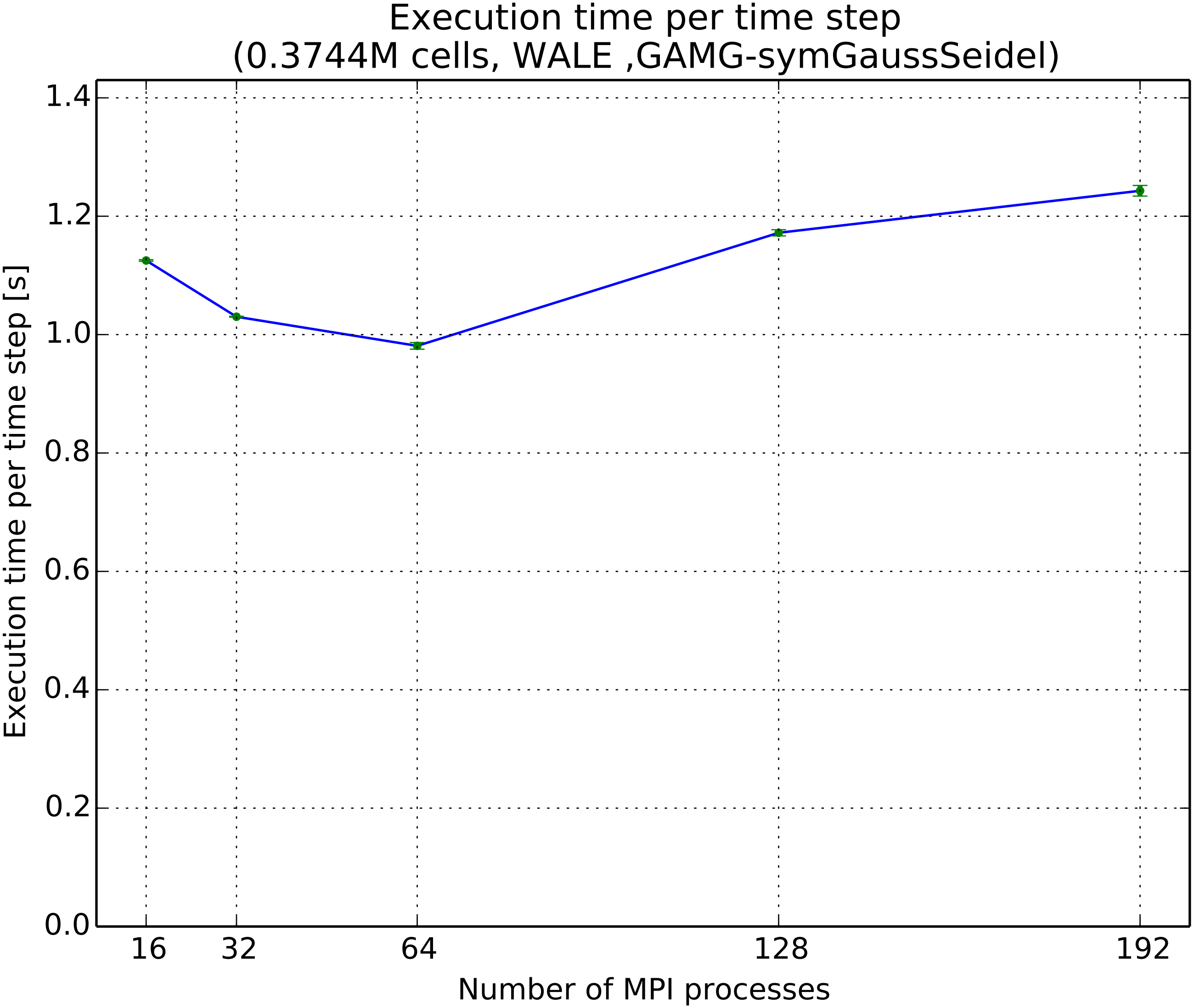
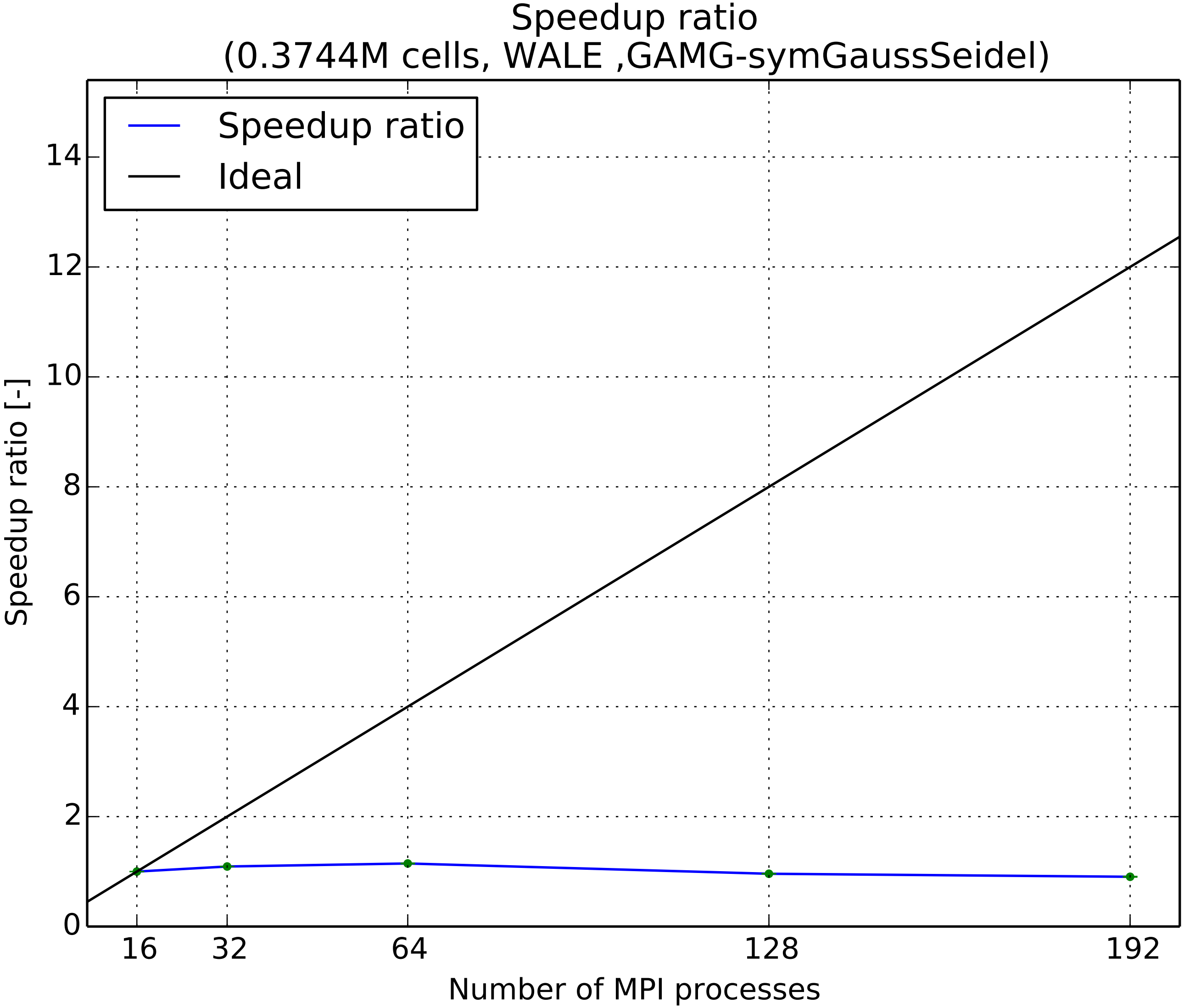
32
64
128
192
Number of MPI processes


Parallel efficiency
(0.3744M cells, WALE ,GAMG-nonBlockingGaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes


Execution time per time step
(0.3744M cells, WALE ,GAMG-symGaussSeidel)
Execution time per time step [s]
Number of MPI processes
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
16
32
64
128
192


Speedup ratio
(0.3744M cells, WALE ,GAMG-symGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
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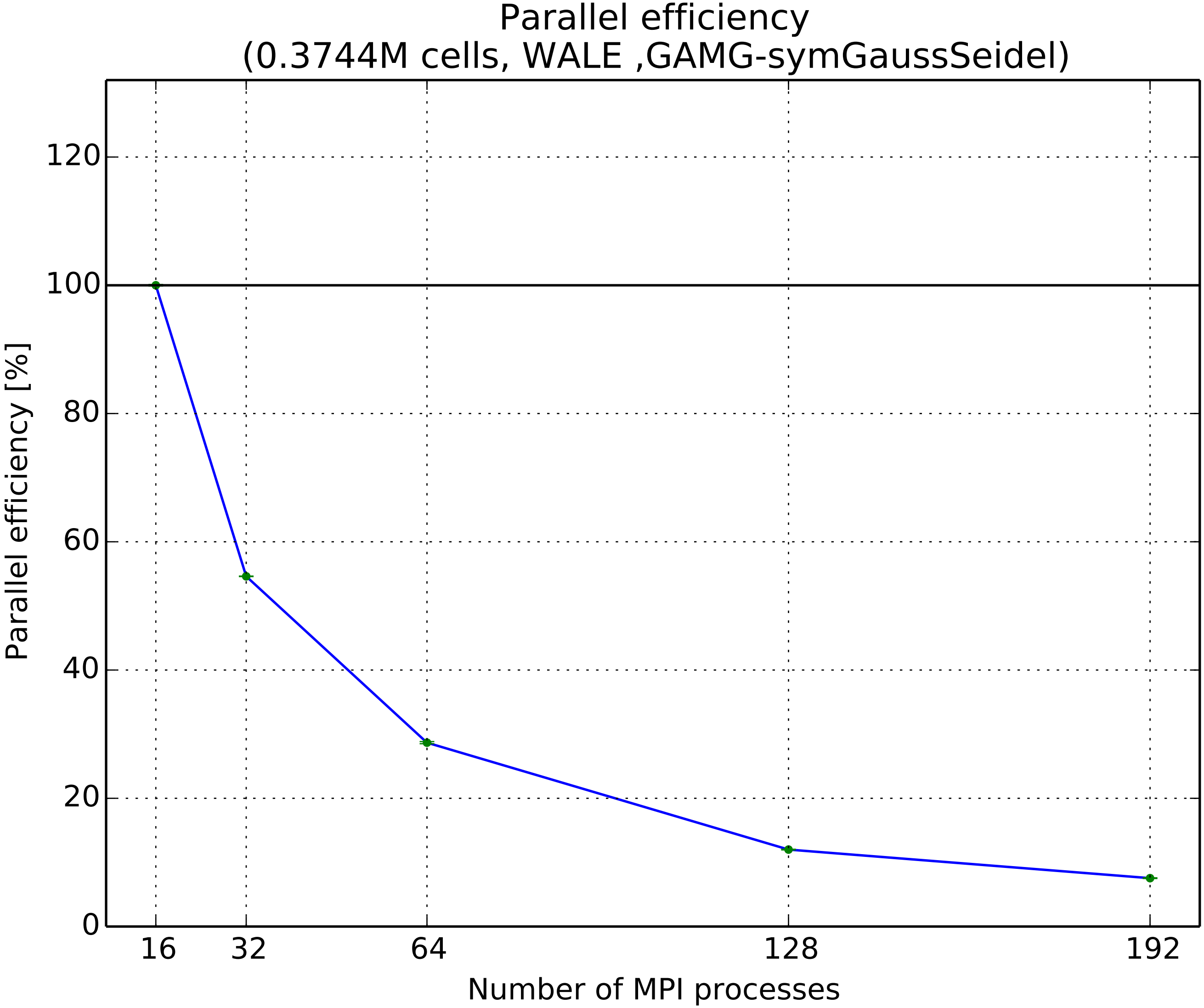
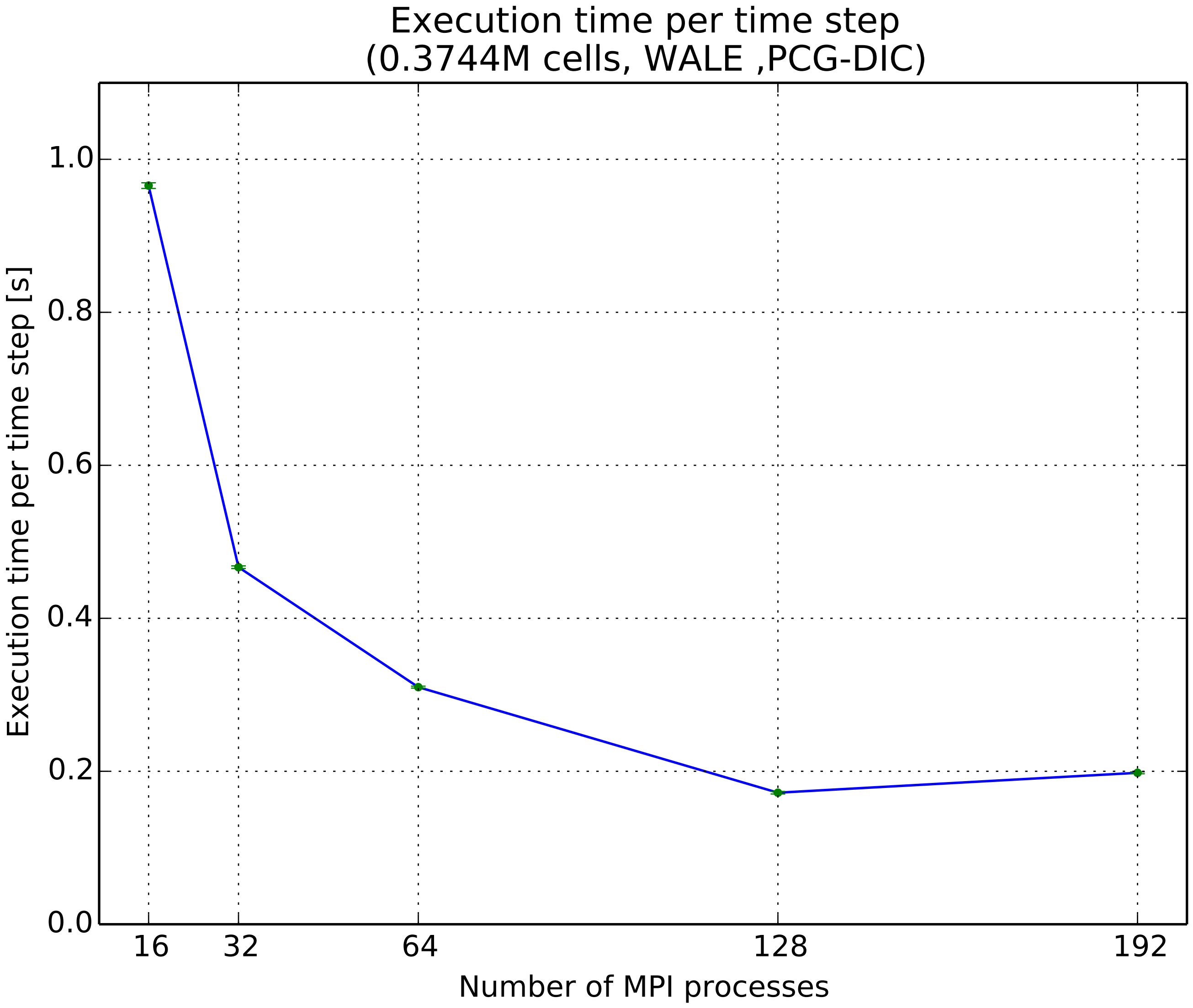
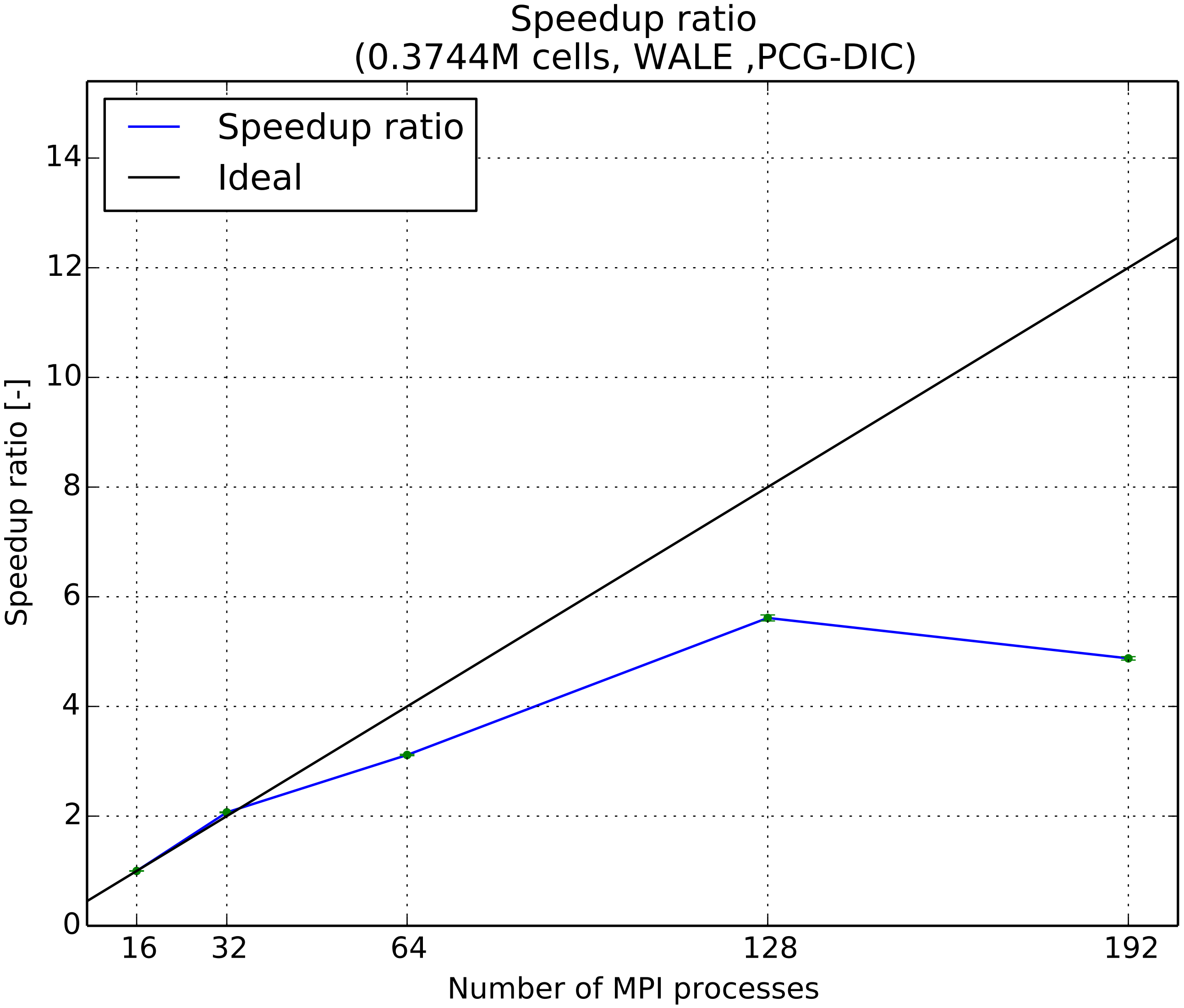
64
128
192
Number of MPI processes


Parallel efficiency
(0.3744M cells, WALE ,GAMG-symGaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes


Execution time per time step
(0.3744M cells, WALE ,PCG-DIC)
Execution time per time step [s]
0.0
0.2
0.4
0.6
0.8
1.0
16
32
64
128
192
Number of MPI processes


Speedup ratio
(0.3744M cells, WALE ,PCG-DIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
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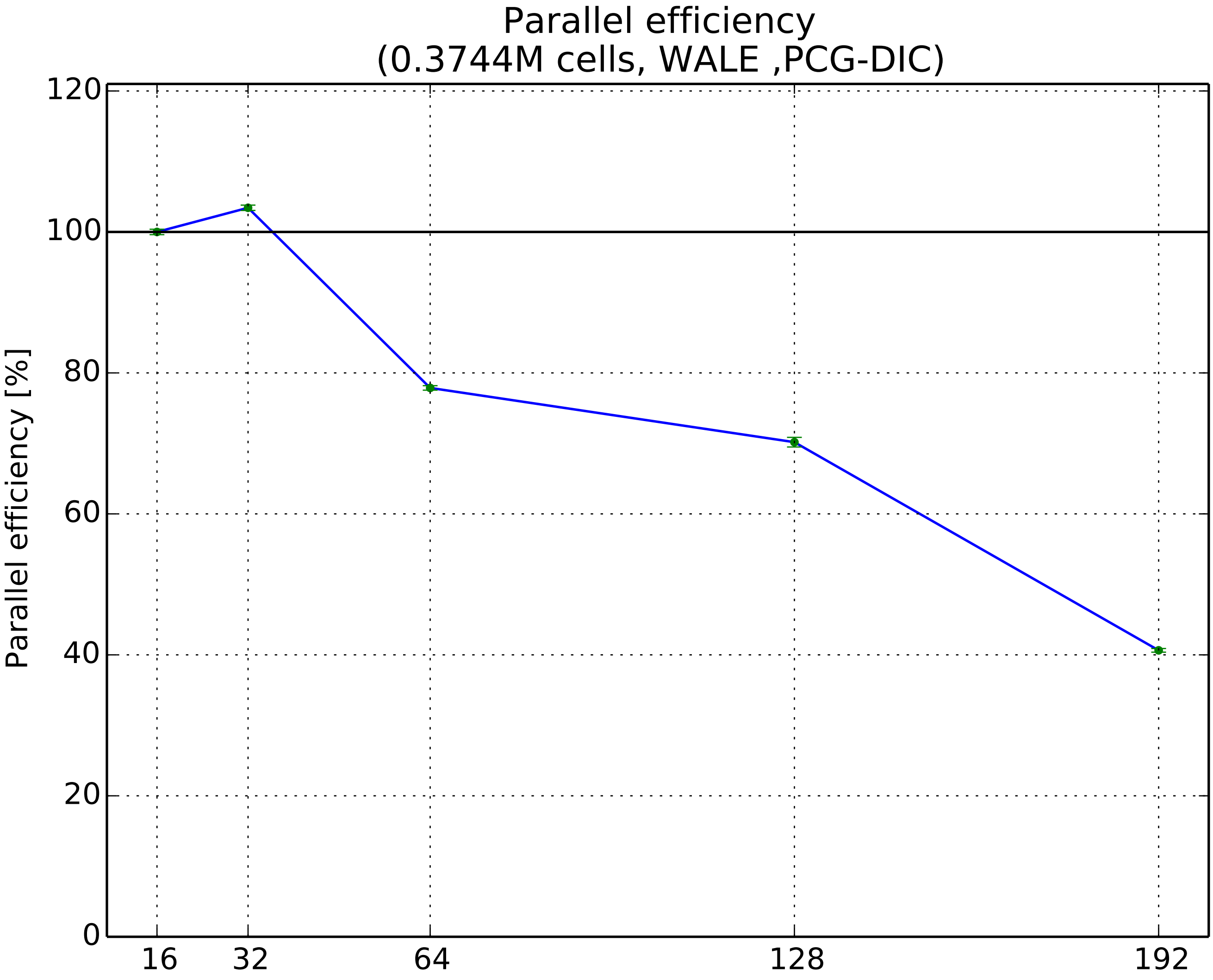
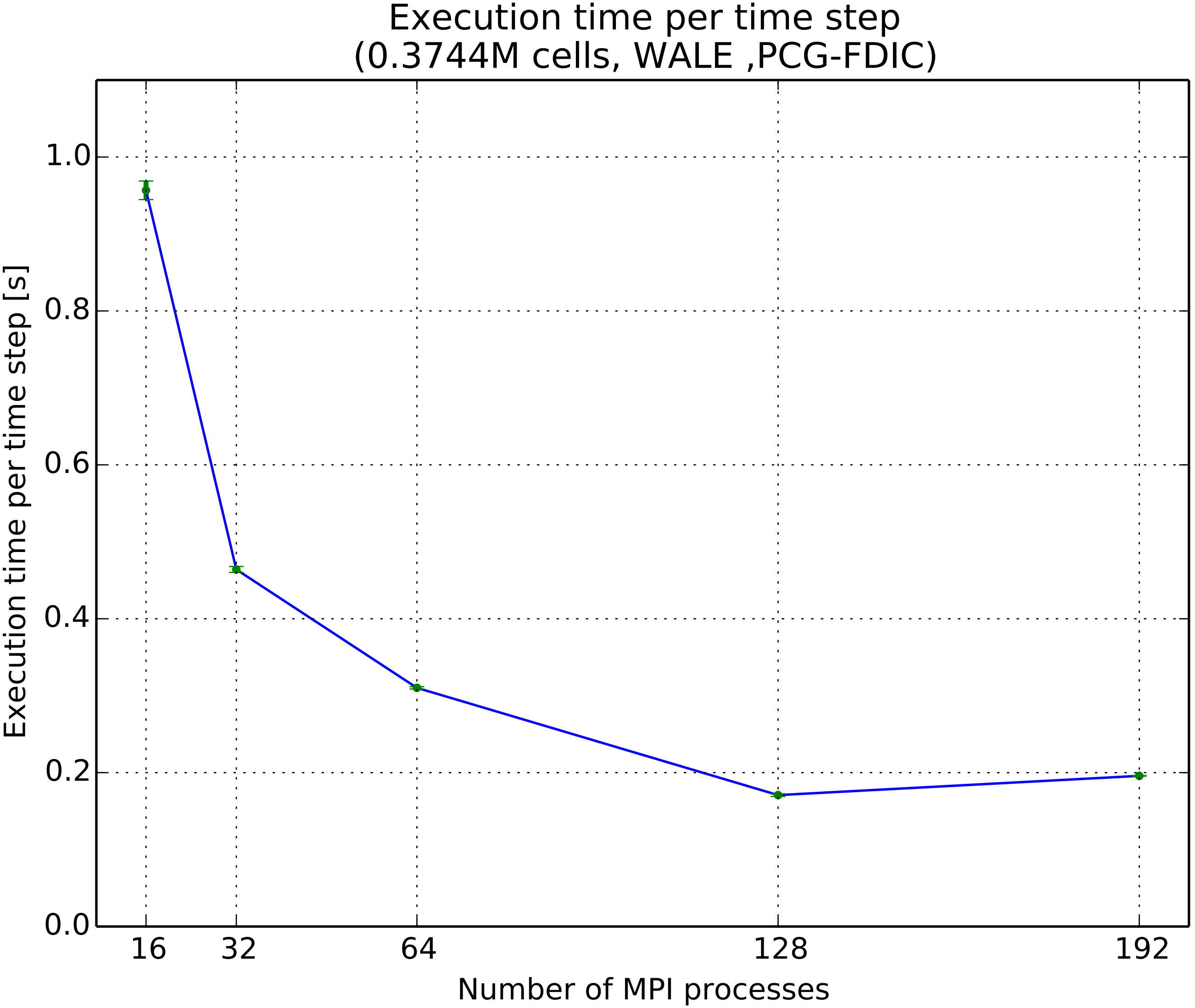
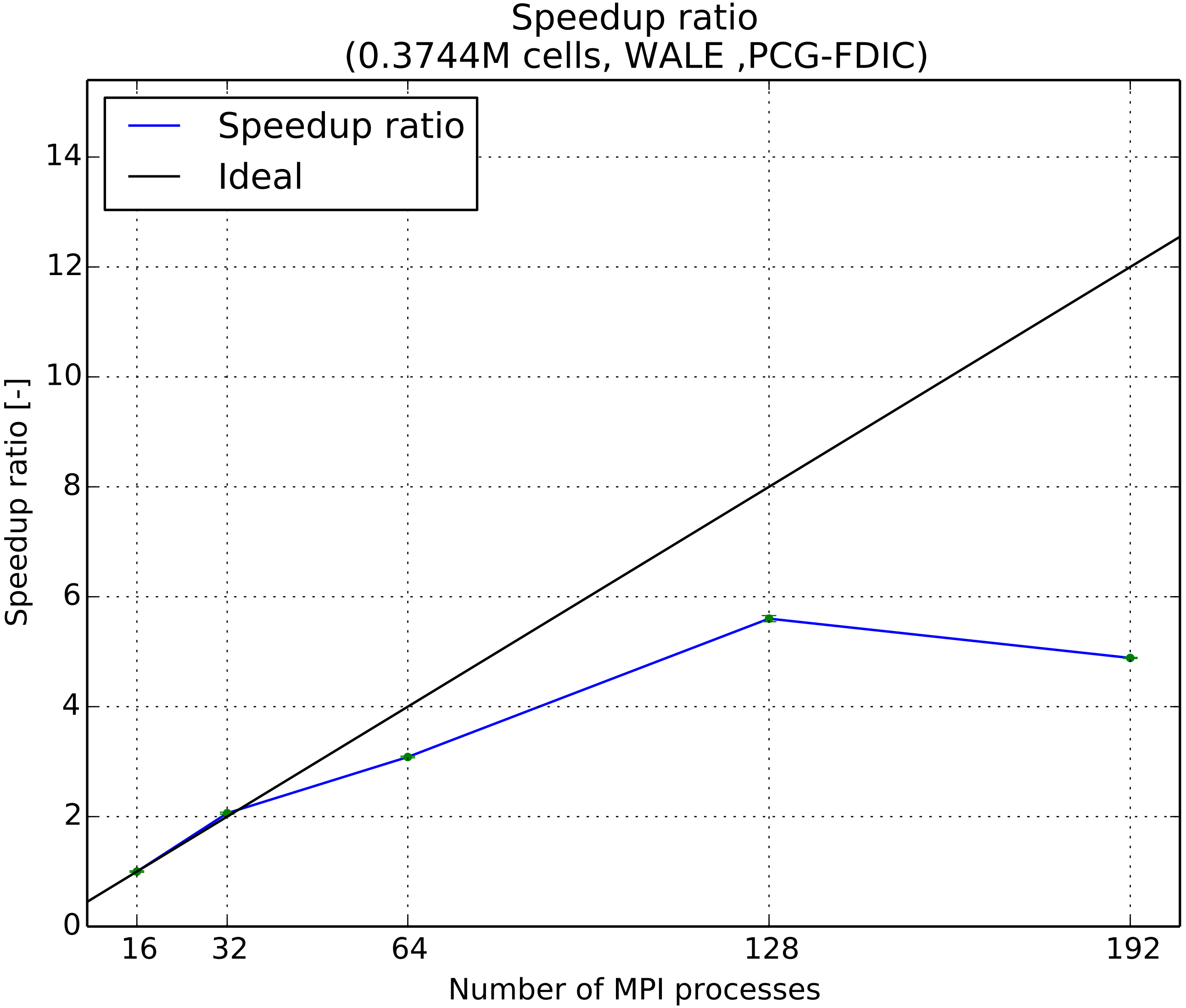
64
128
192
Number of MPI processes


Parallel efficiency
(0.3744M cells, WALE ,PCG-DIC)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes


Execution time per time step
(0.3744M cells, WALE ,PCG-FDIC)
Execution time per time step [s]
1.0
0.8
0.6
0.4
0.2
0.0
16
32
64
128
192
Number of MPI processes


Speedup ratio
(0.3744M cells, WALE ,PCG-FDIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
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8
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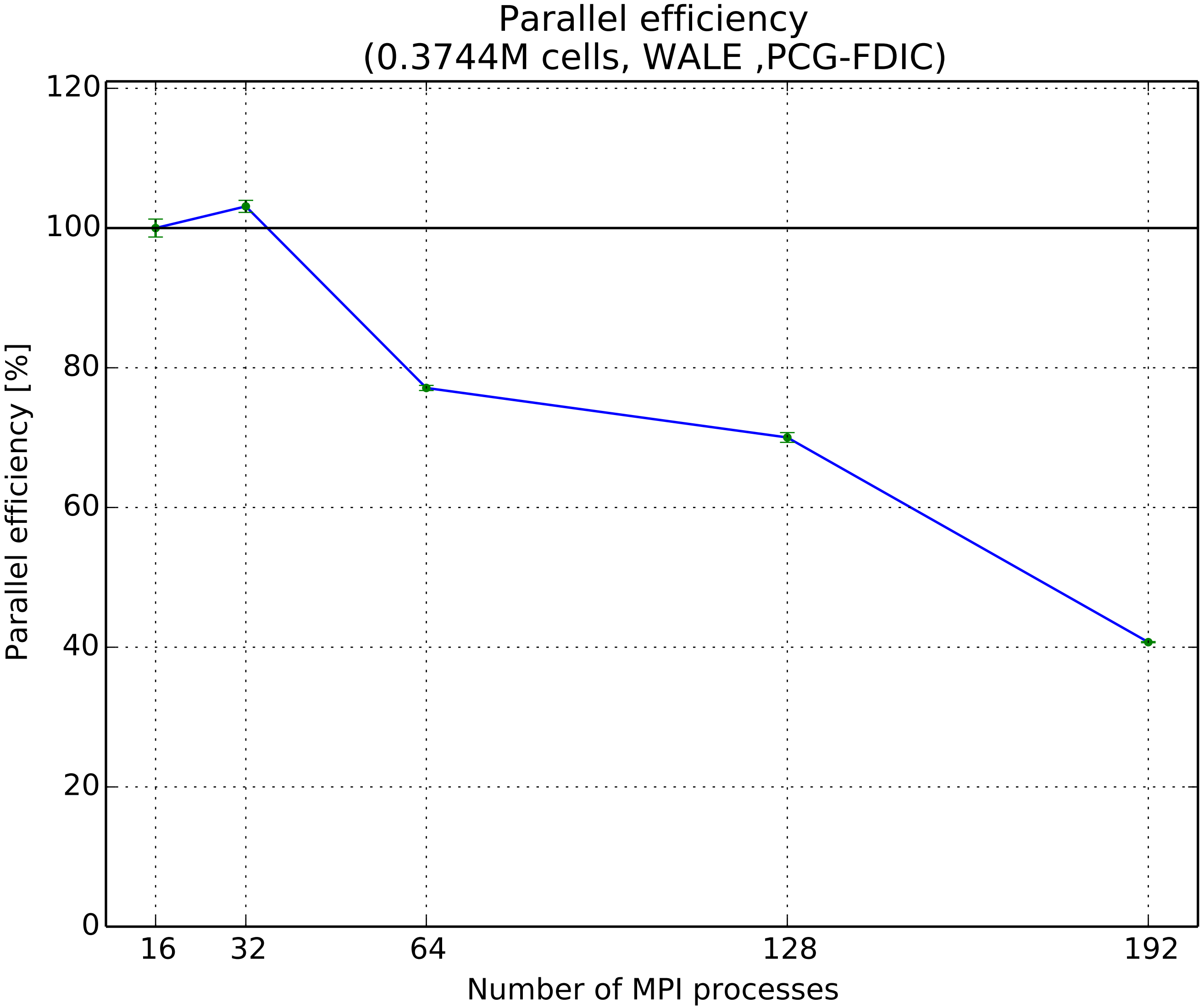
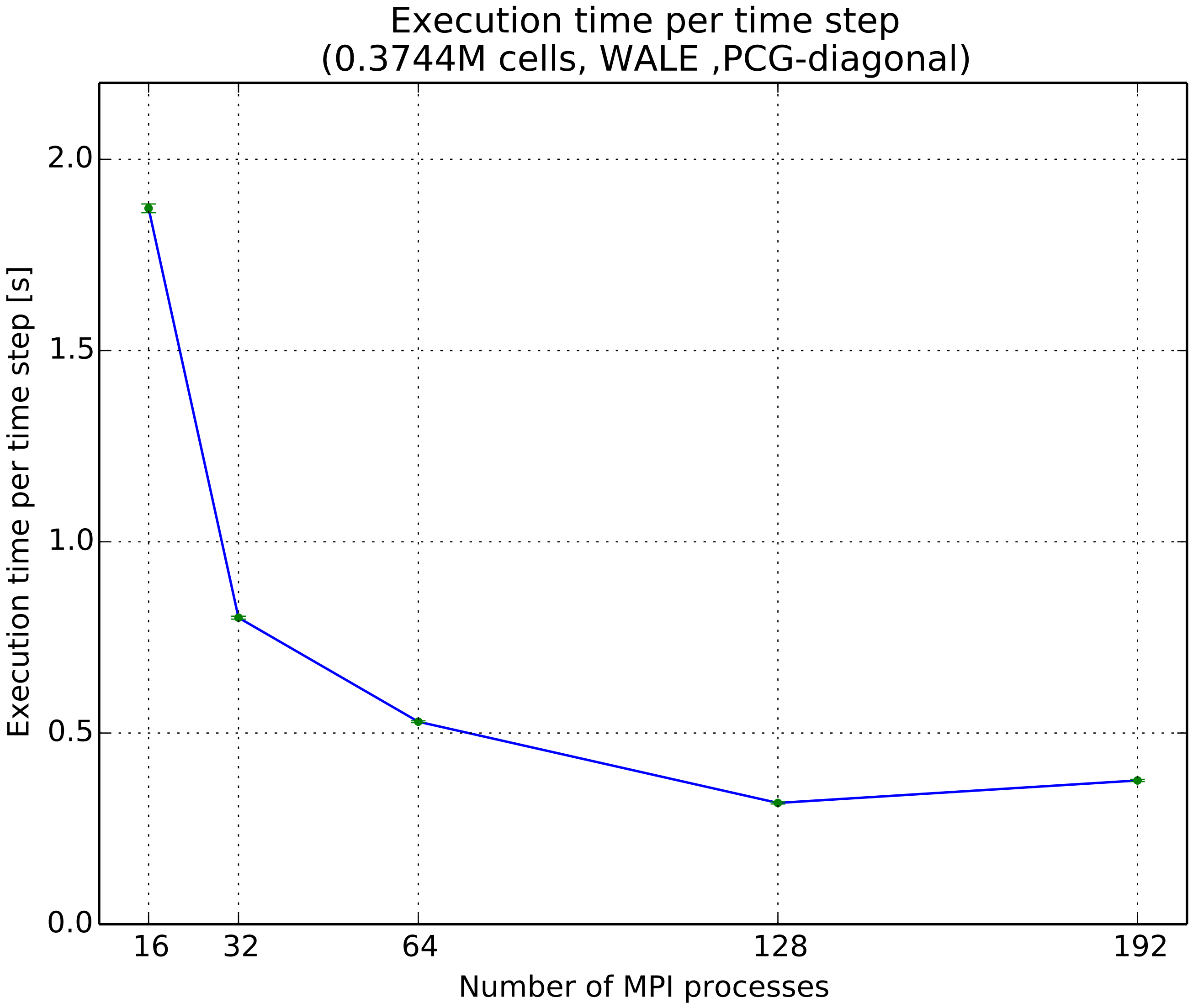
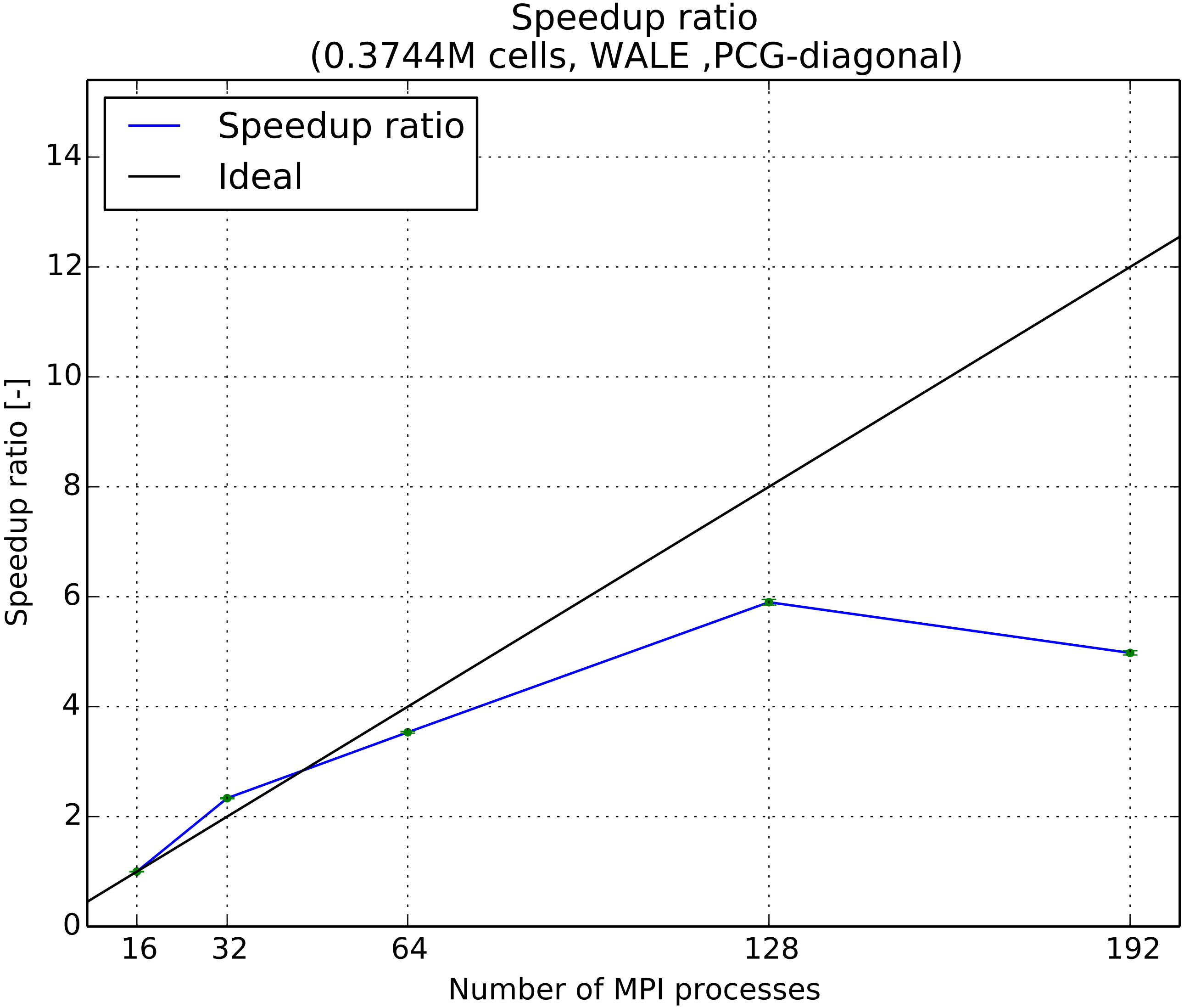
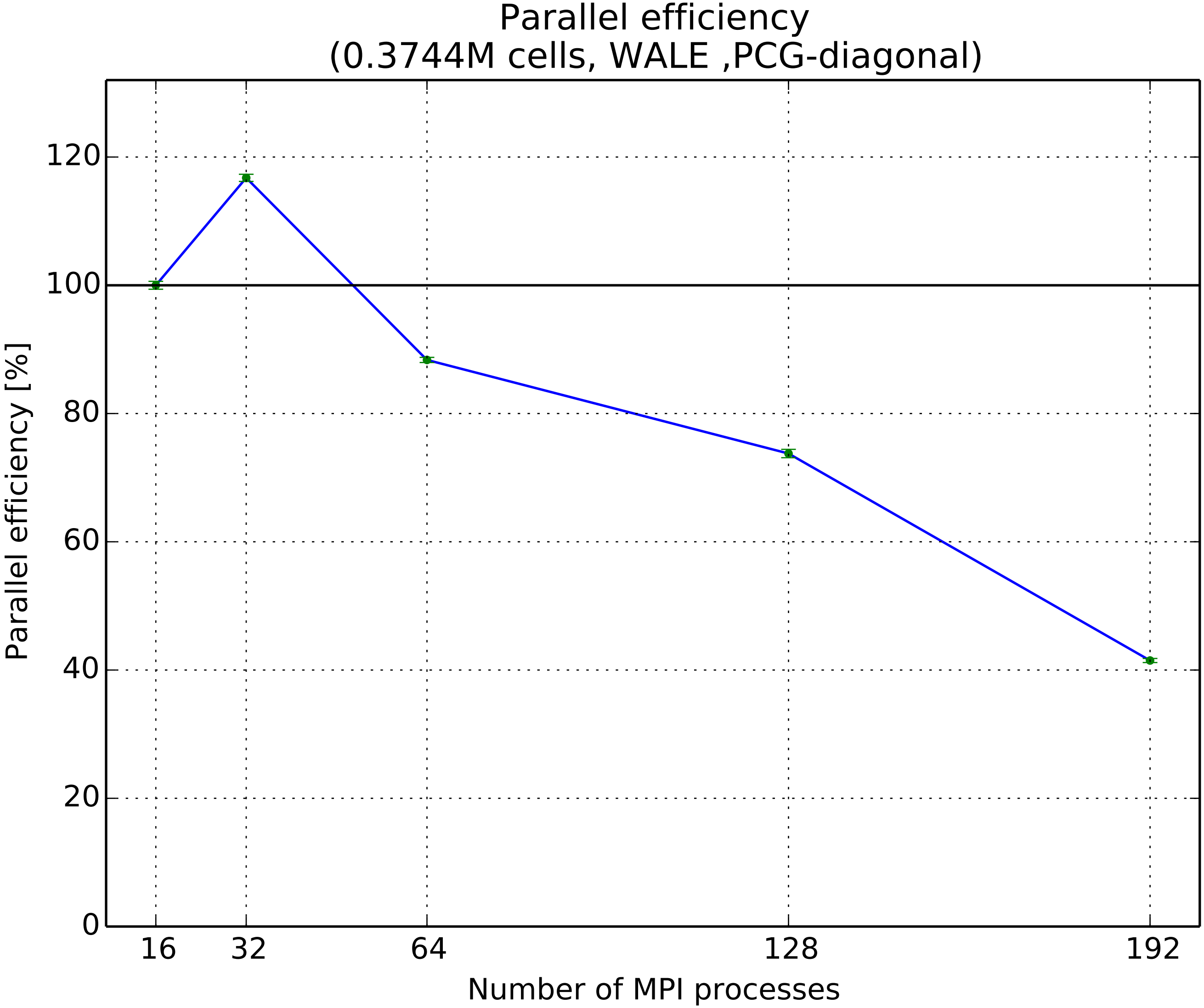
12
14
16
32
64
128
192
Number of MPI processes

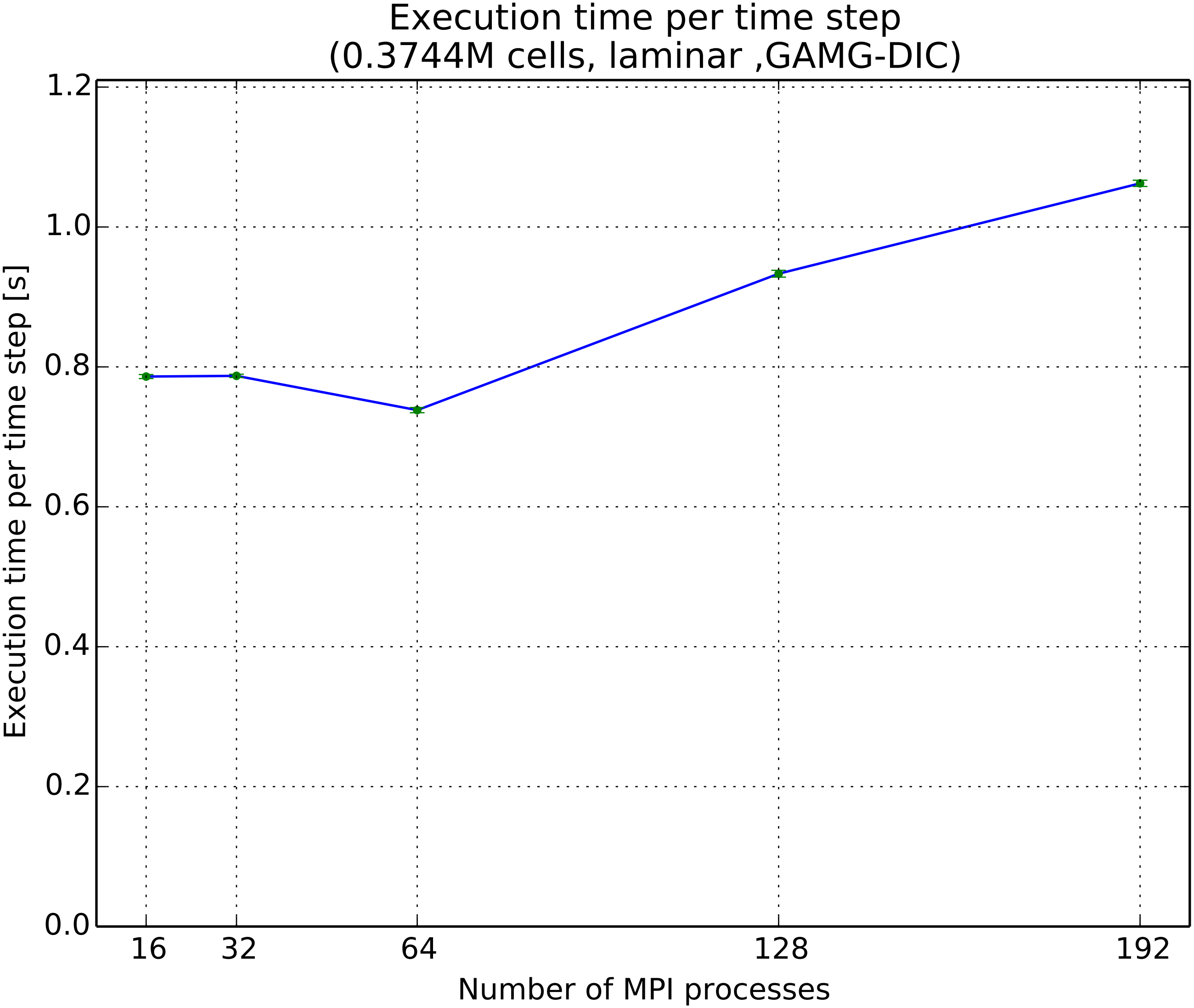

Parallel efficiency
(0.3744M cells, WALE ,PCG-FDIC)
120
100
80
60
40
20
0
Parallel efficiency [%]
16
32
64
128
192
Number of MPI processes

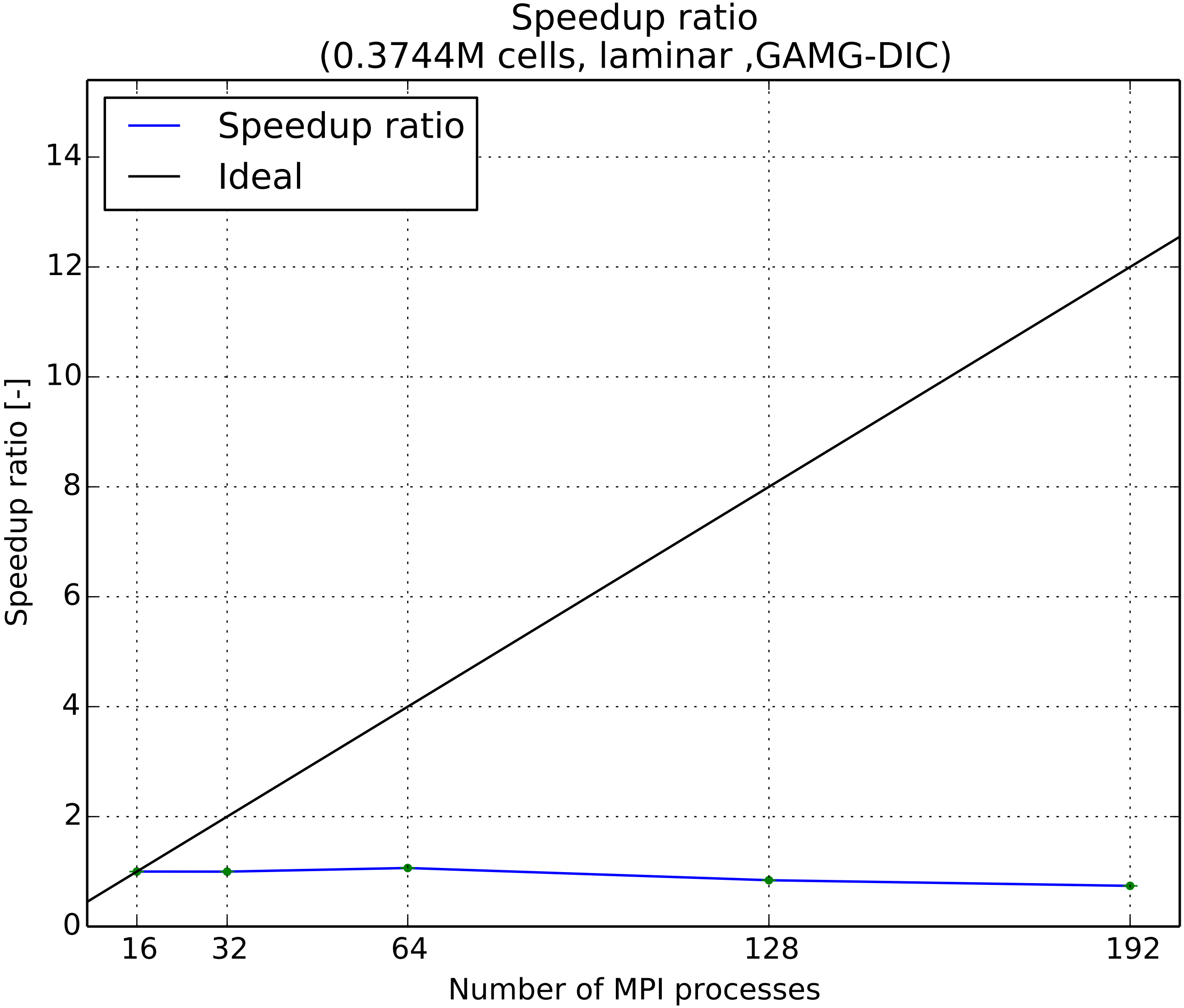

Execution time per time step
(0.3744M cells, WALE ,PCG-diagonal)
Execution time per time step [s]
2.0
1.5
1.0
0.5
0.0
16
32
64
128
192
Number of MPI processes

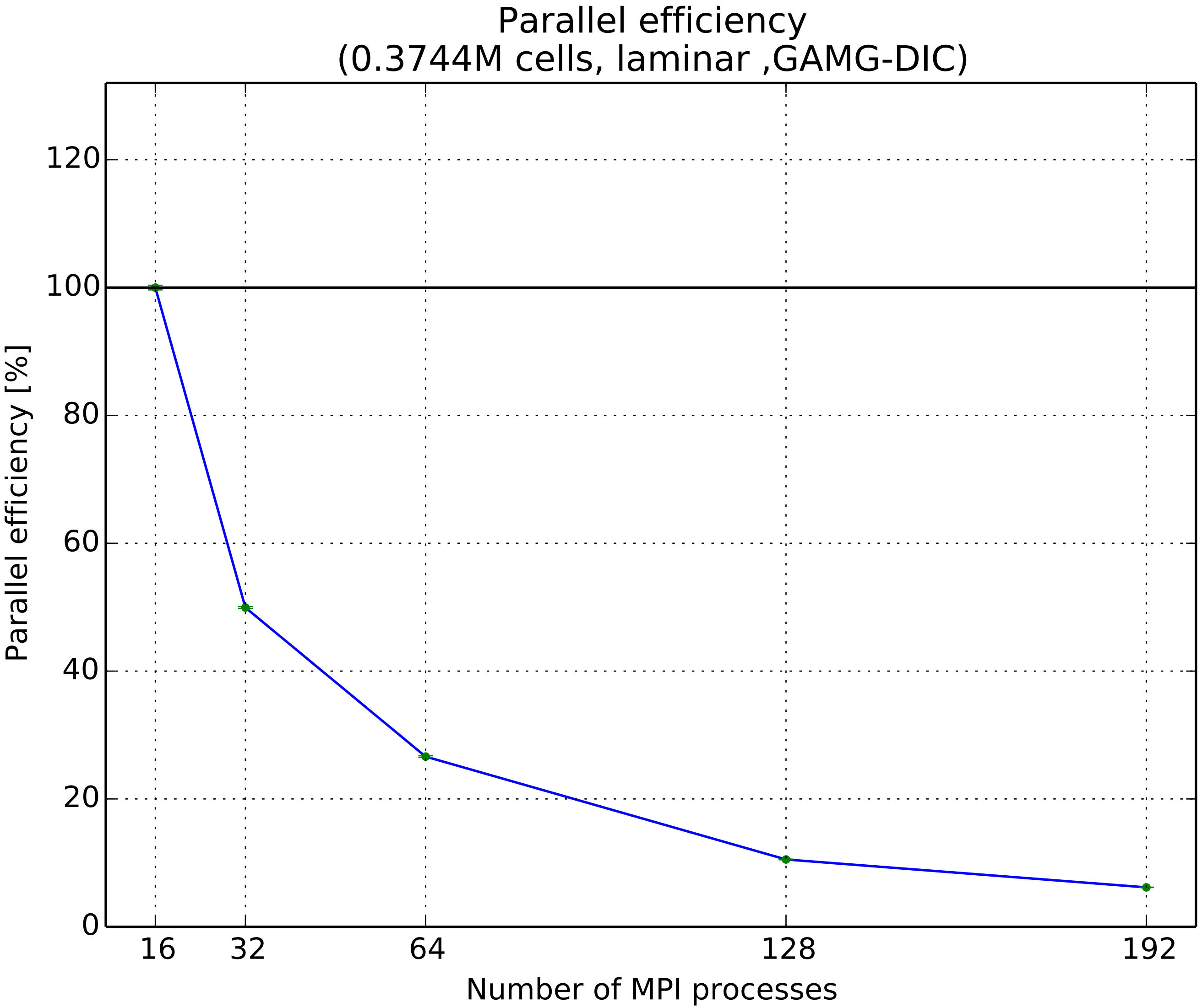


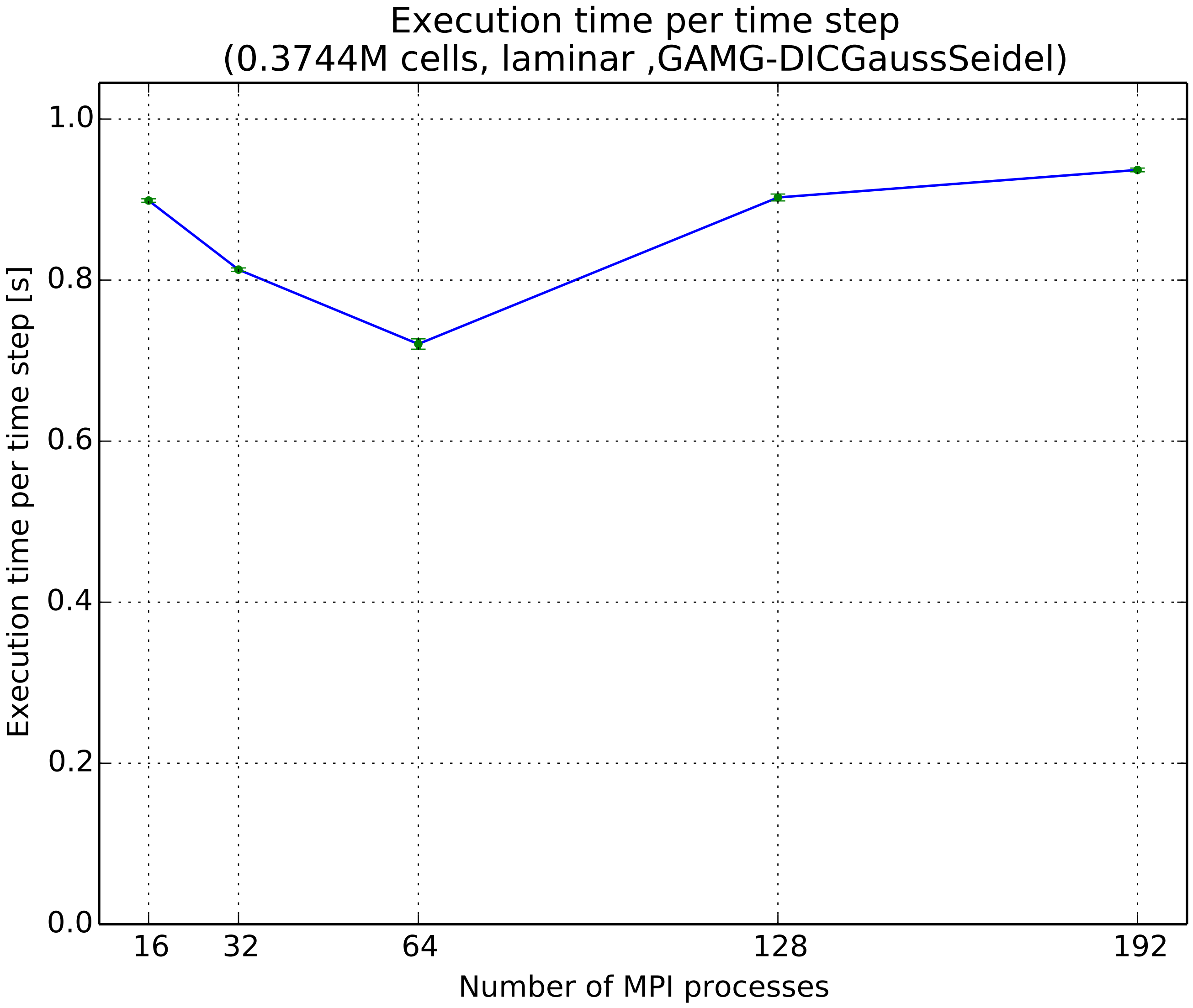
Speedup ratio
(0.3744M cells, WALE ,PCG-diagonal)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

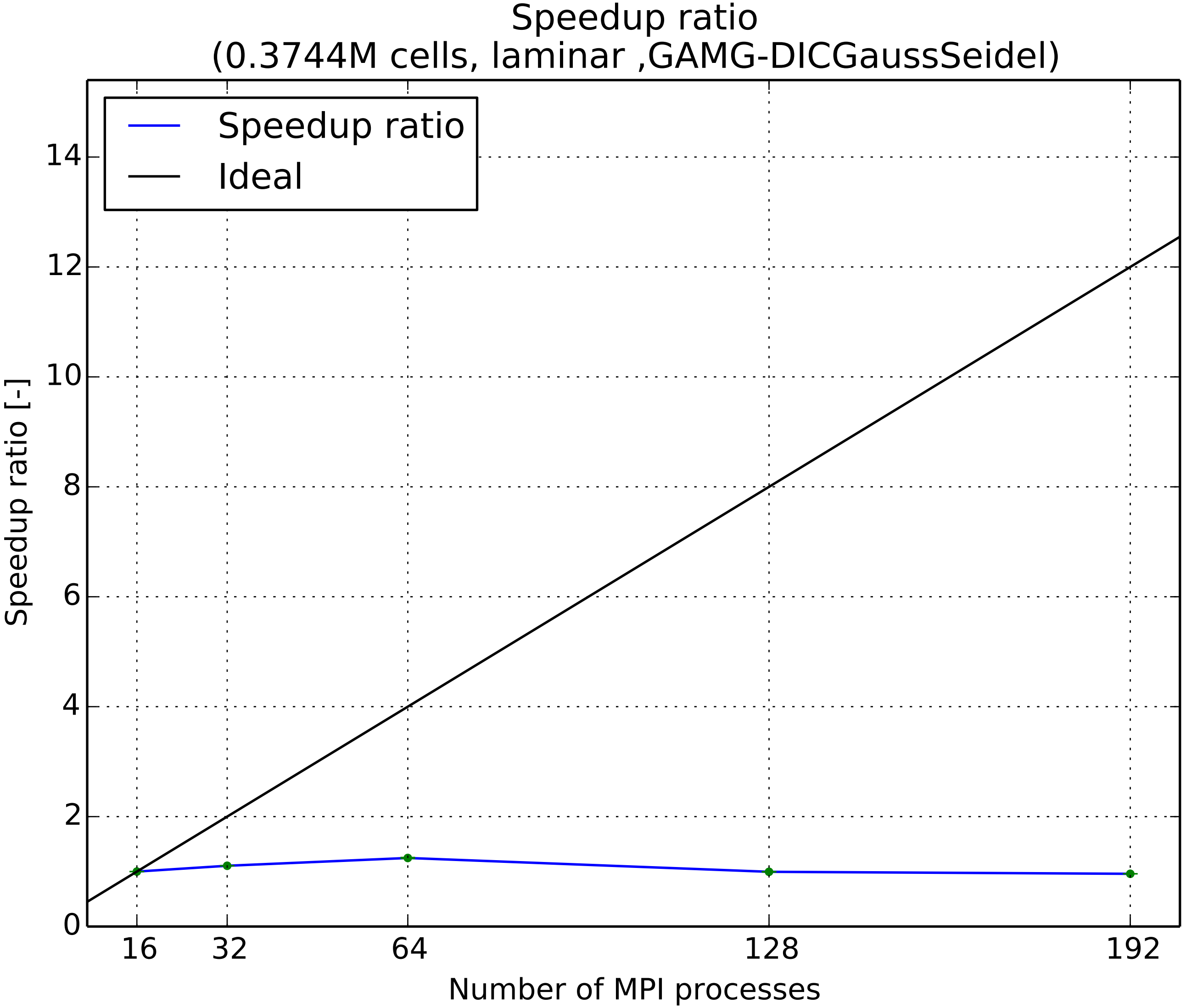

Parallel efficiency
(0.3744M cells, WALE ,PCG-diagonal)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes

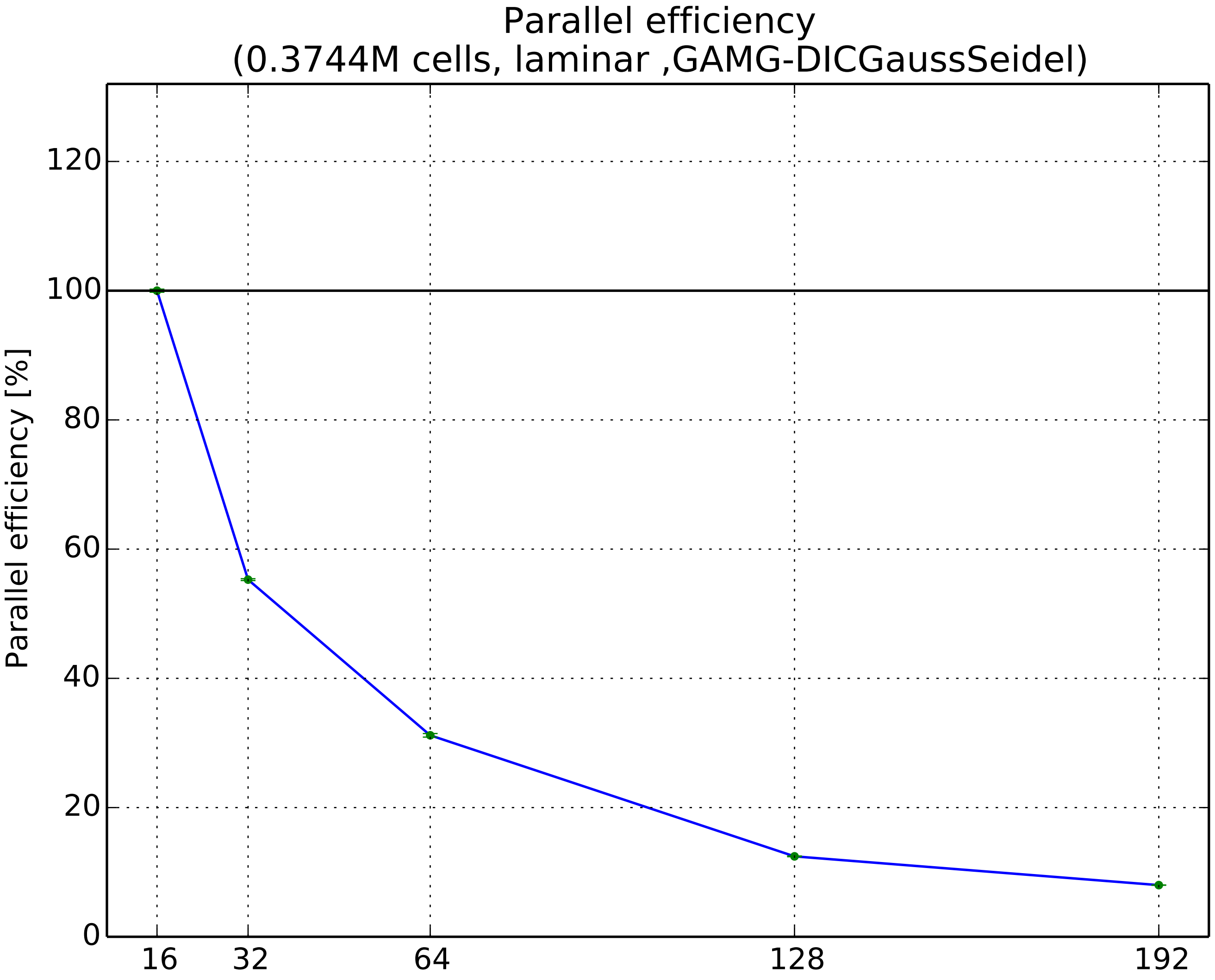

Execution time per time step
(0.3744M cells, laminar ,GAMG-DIC)
Execution time per time step [s]
1.2
1.0
0.8
0.6
0.4
0.2
0.0
16
32
64
128
192
Number of MPI processes

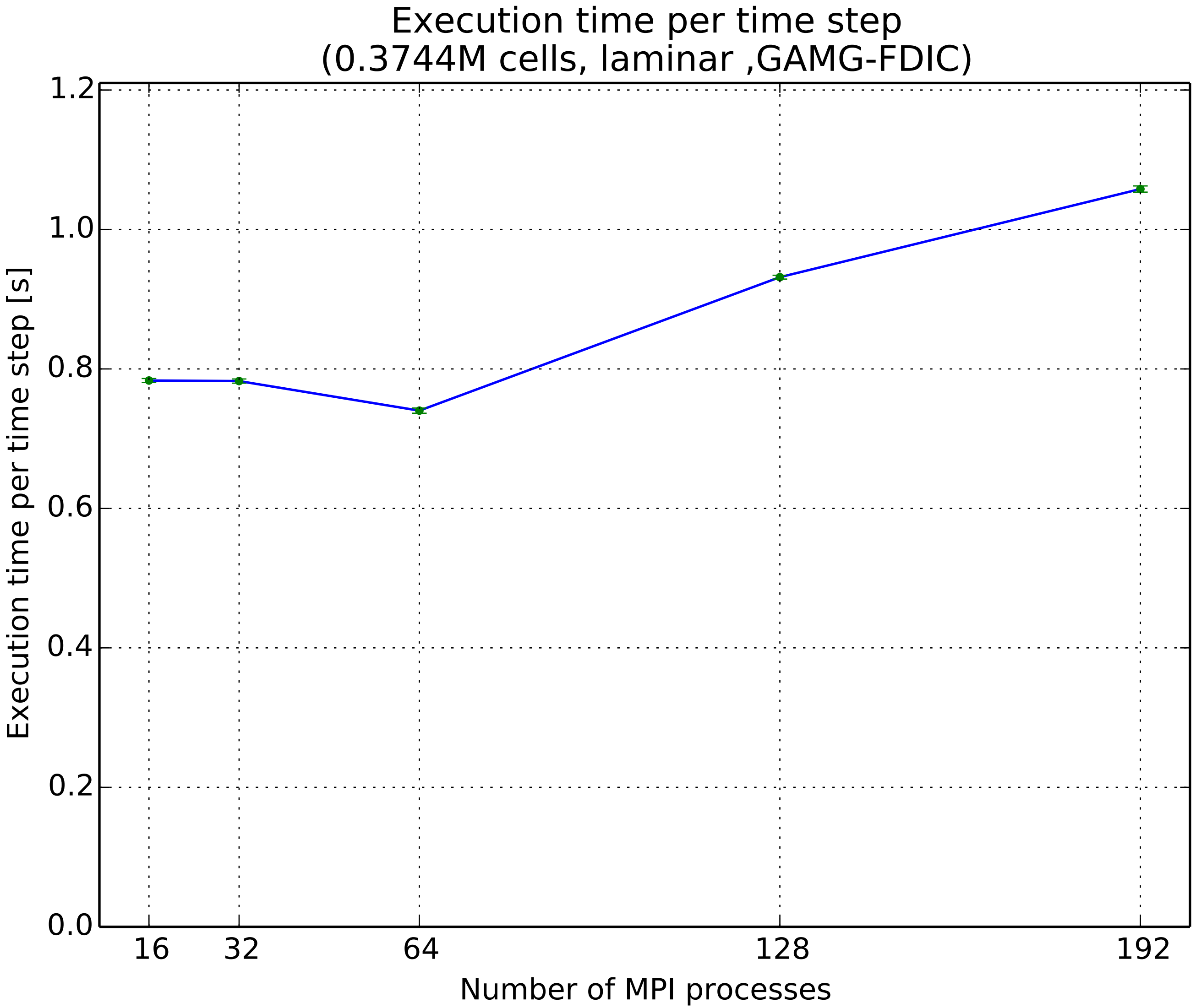

Speedup ratio
(0.3744M cells, laminar ,GAMG-DIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

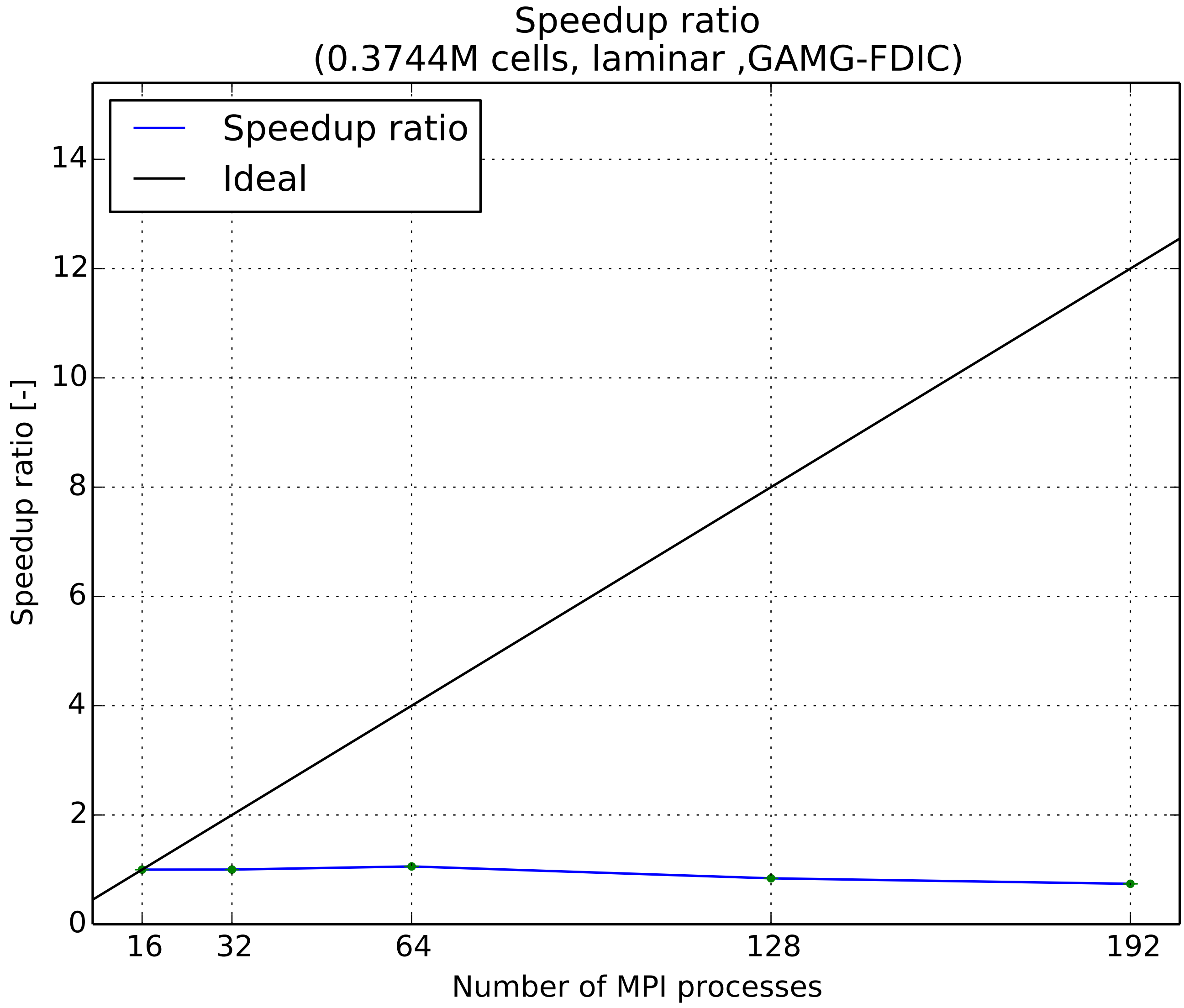

Parallel efficiency
(0.3744M cells, laminar ,GAMG-DIC)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes

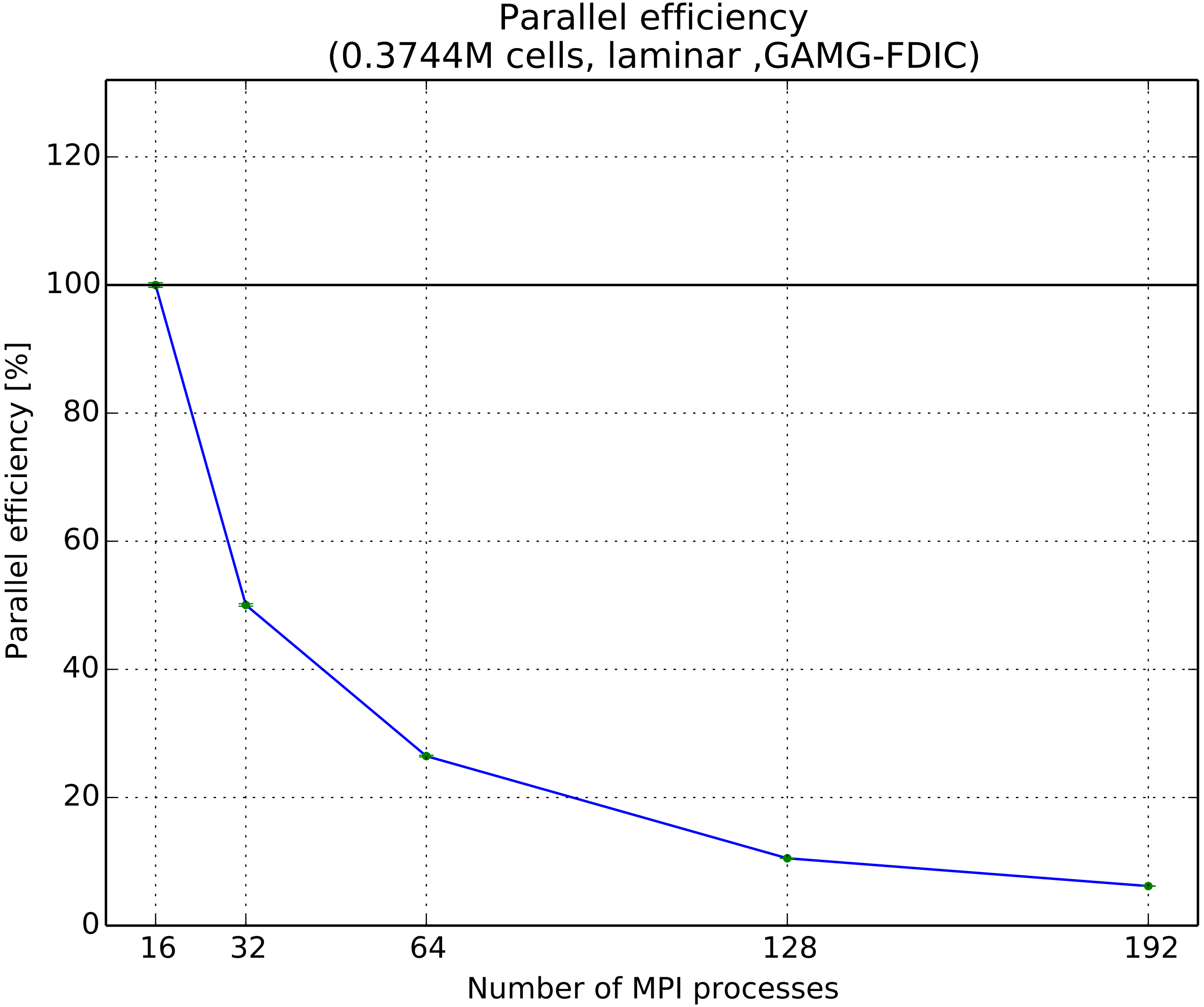

Execution time per time step
(0.3744M cells, laminar ,GAMG-DICGaussSeidel)
Execution time per time step [s]
1.0
0.8
0.6
0.4
0.2
0.0
16
32
64
128
192
Number of MPI processes

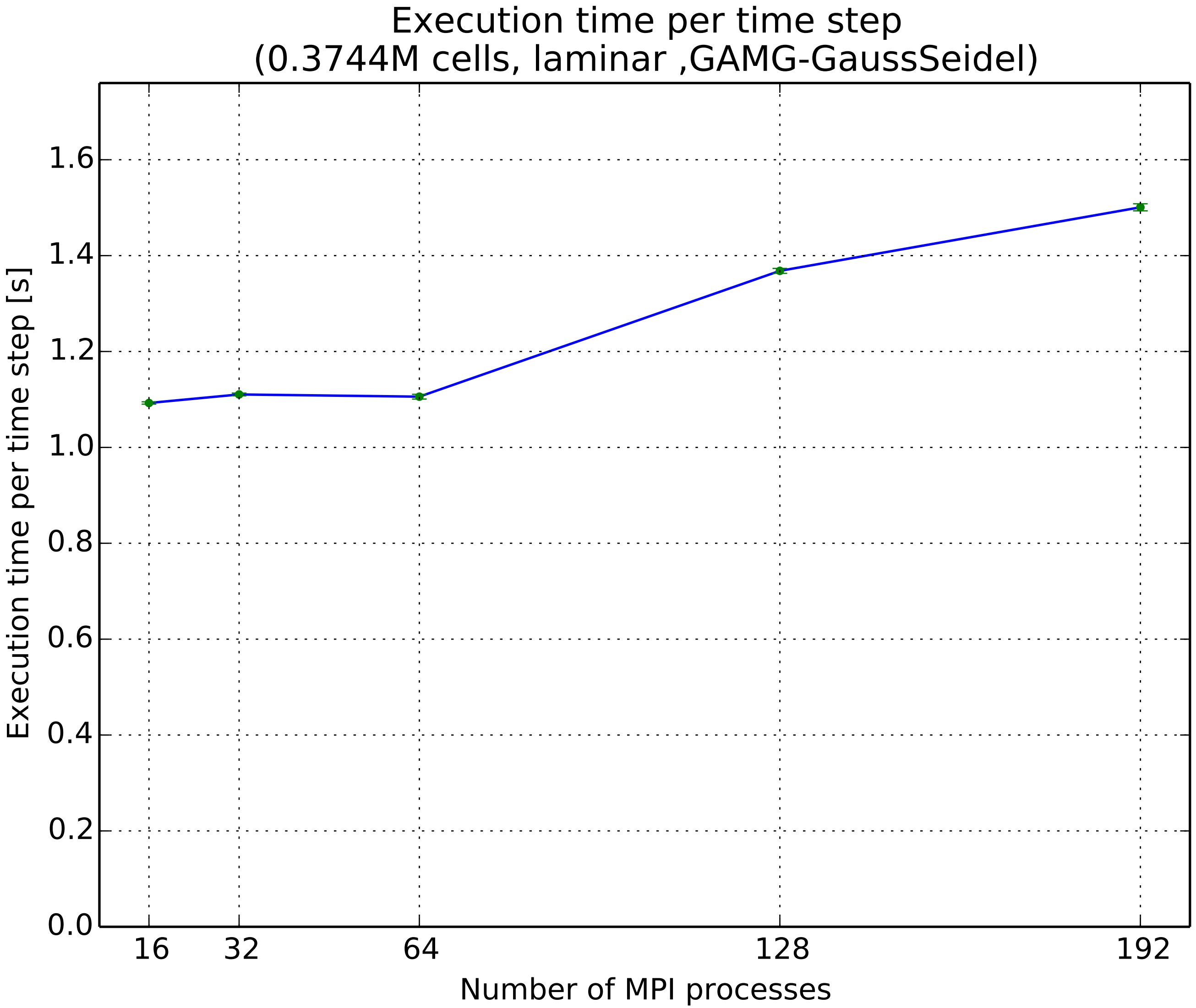

Speedup ratio
(0.3744M cells, laminar ,GAMG-DICGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

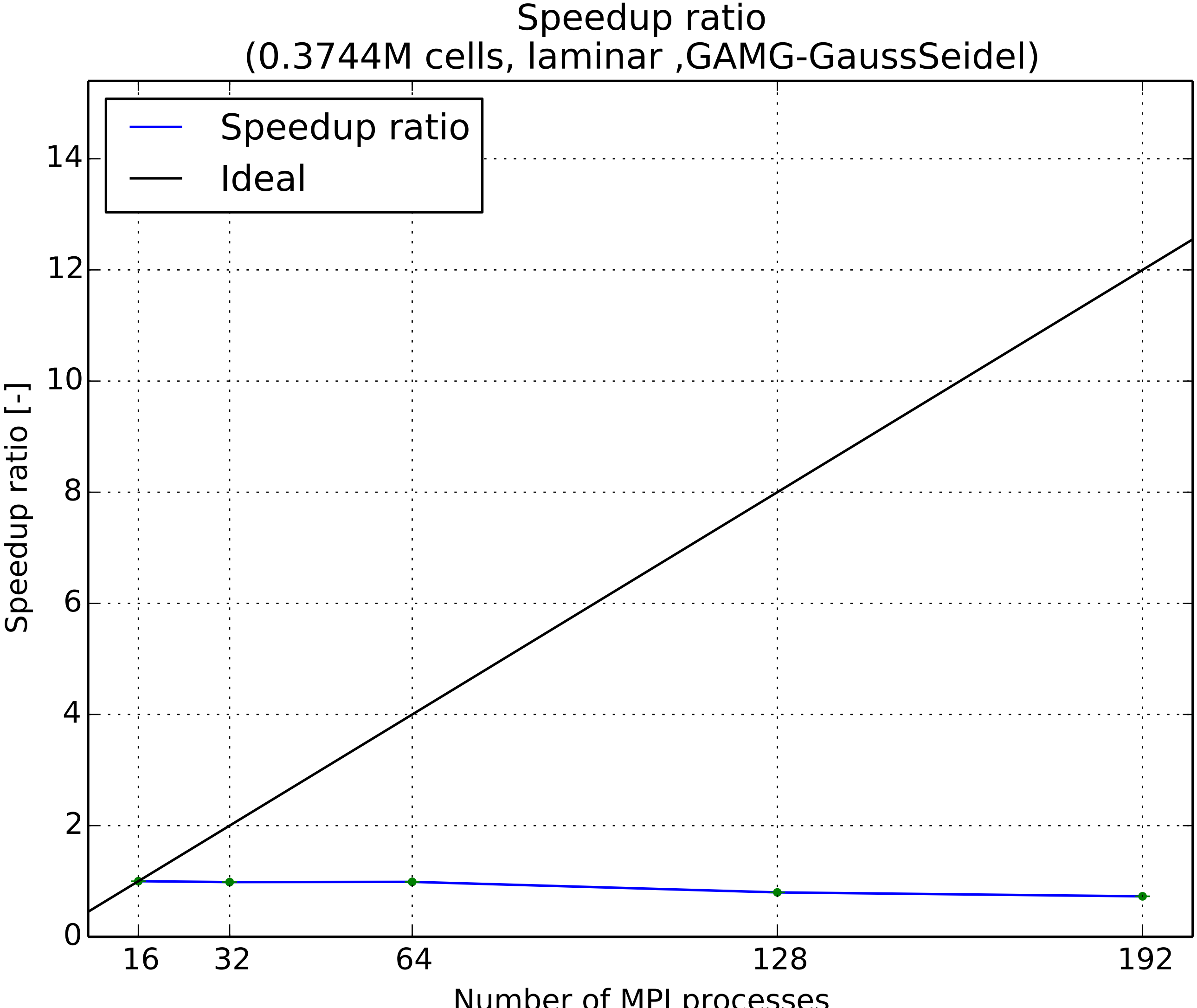

Parallel efficiency
(0.3744M cells, laminar ,GAMG-DICGaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes

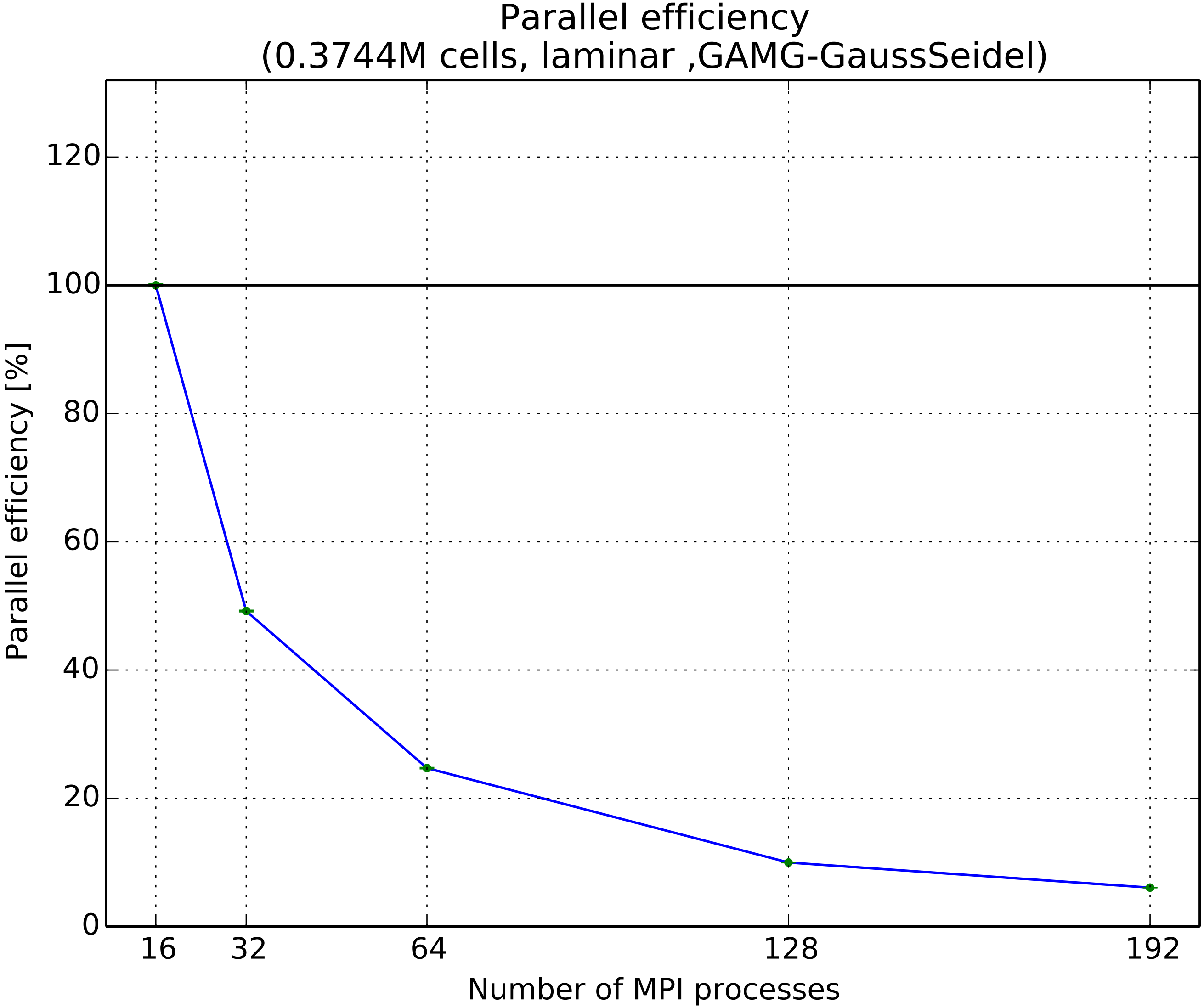

Execution time per time step
(0.3744M cells, laminar ,GAMG-FDIC)
Execution time per time step [s]
0.0
0.2
0.4
0.6
0.8
1.0
1.2
16
32
64
128
192
Number of MPI processes

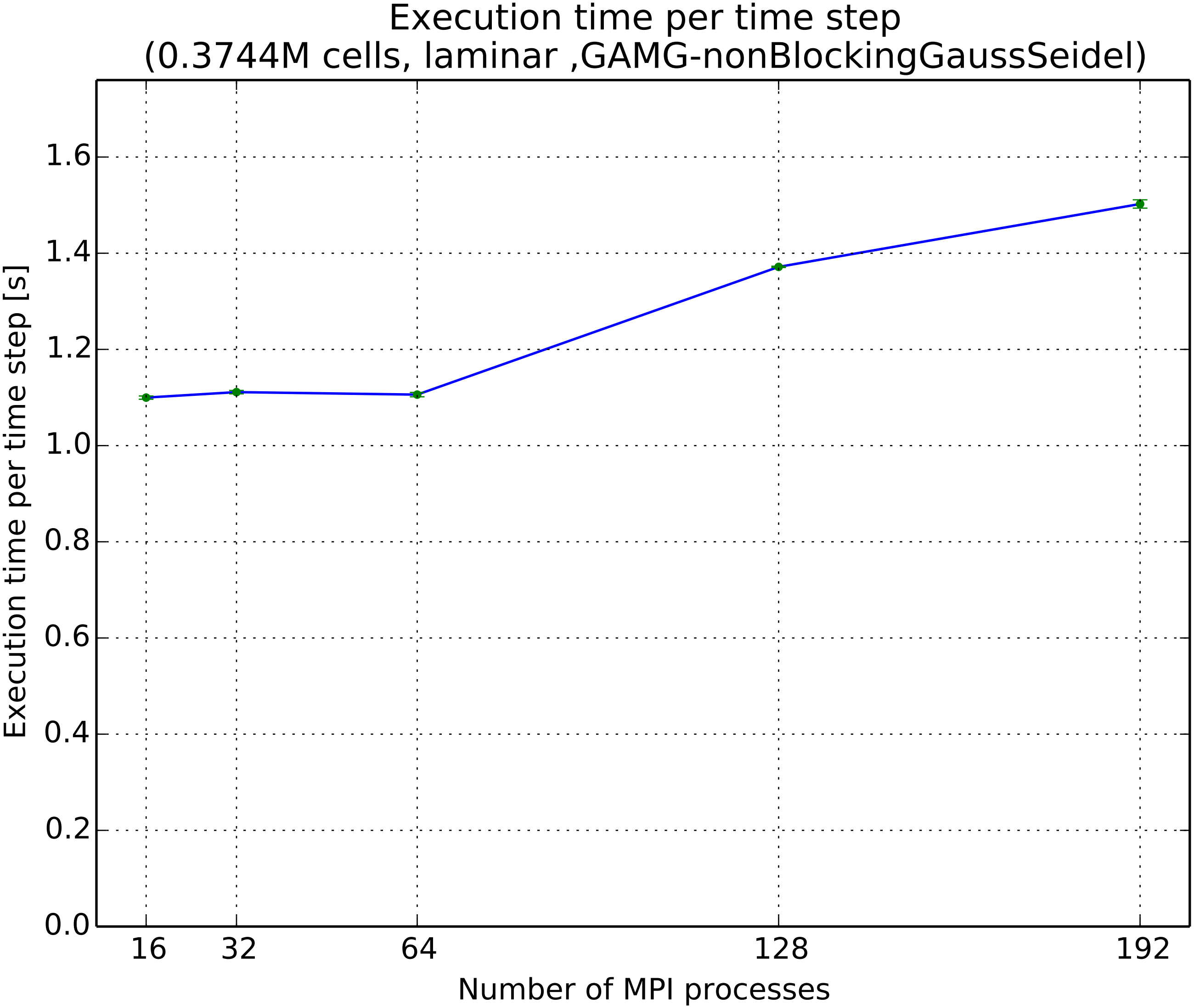

Speedup ratio
(0.3744M cells, laminar ,GAMG-FDIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

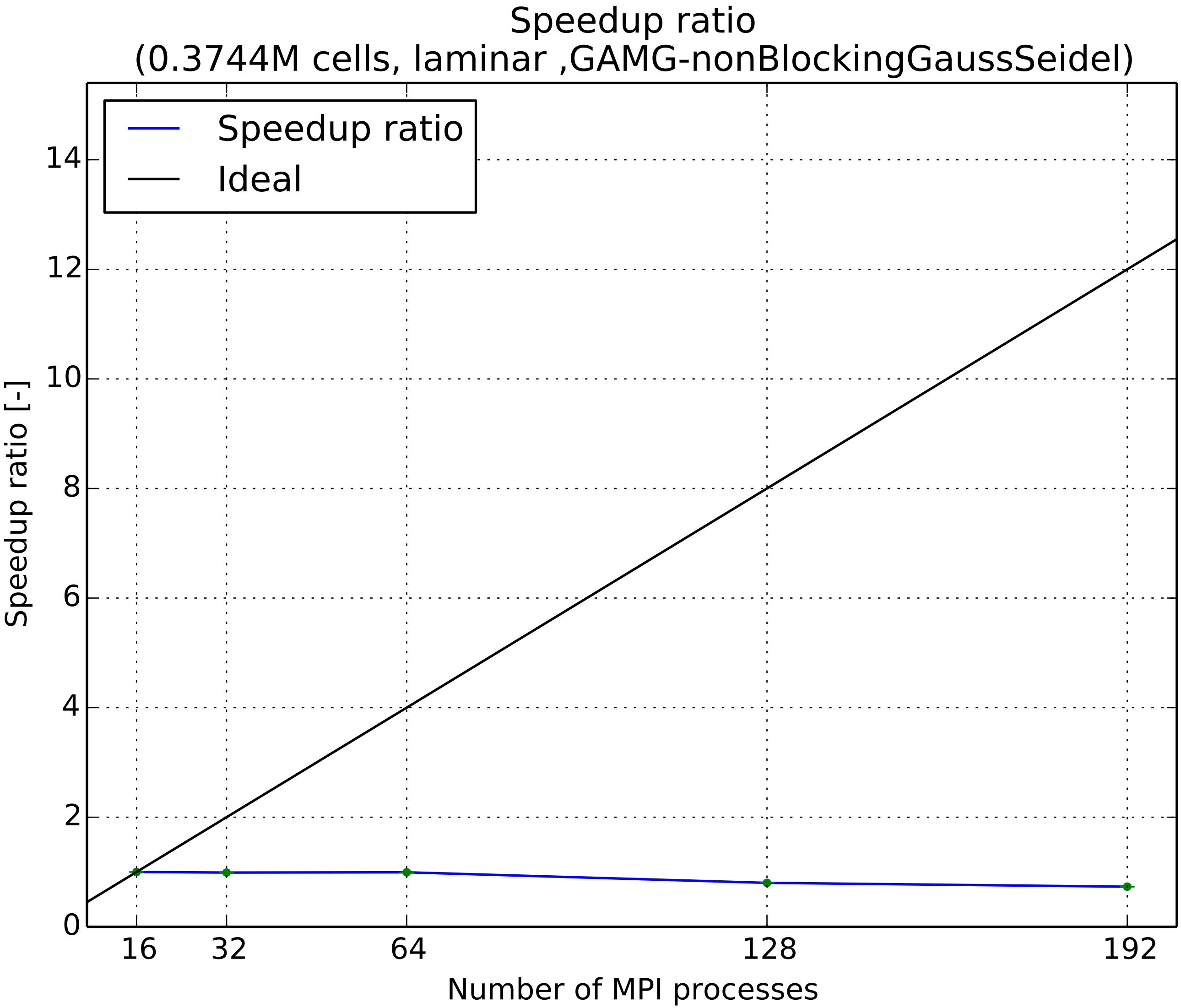

Parallel efficiency
(0.3744M cells, laminar ,GAMG-FDIC)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes

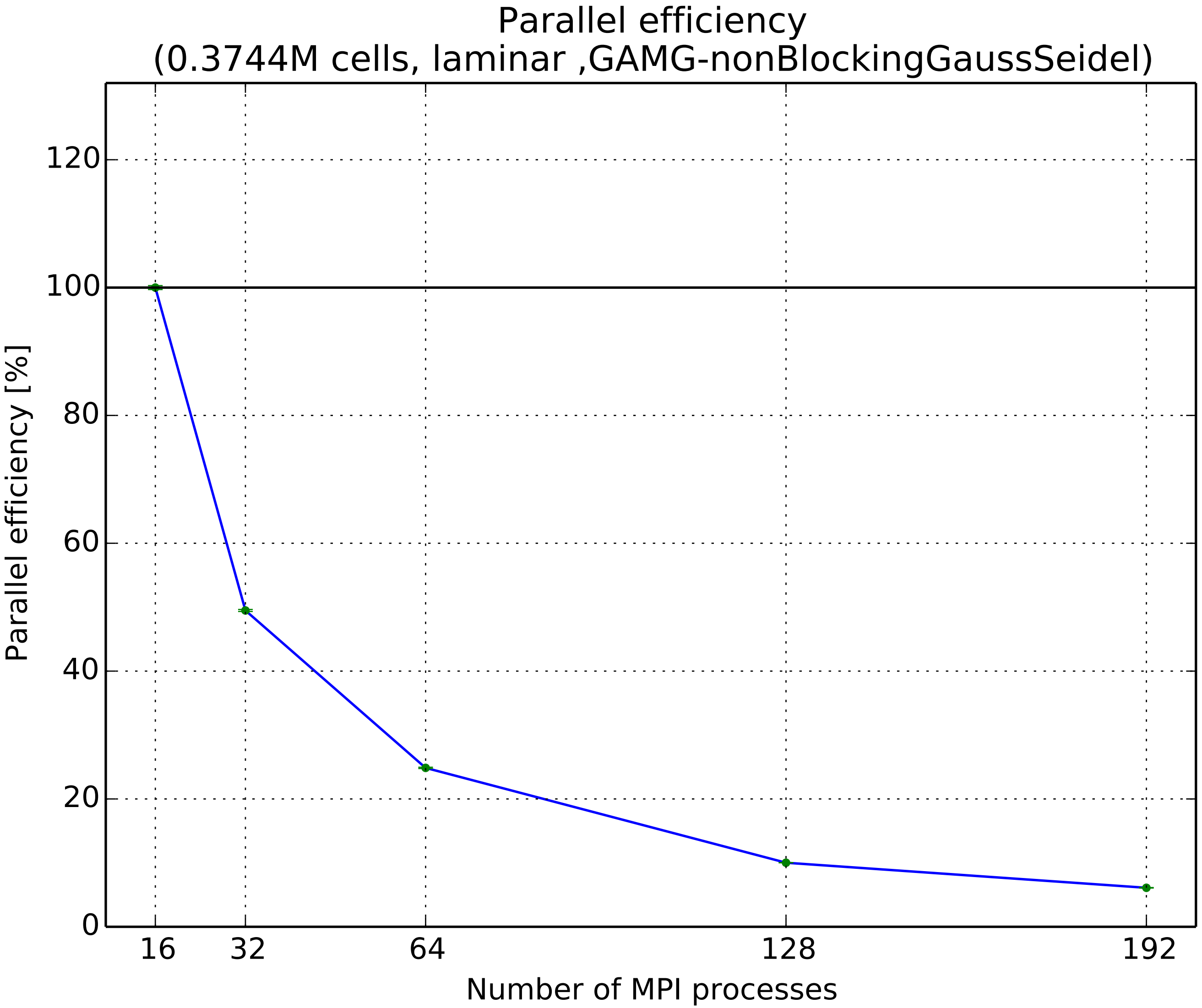

Execution time per time step
(0.3744M cells, laminar ,GAMG-GaussSeidel)
Execution time per time step [s]
Number of MPI processes
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
16
32
64
128
192

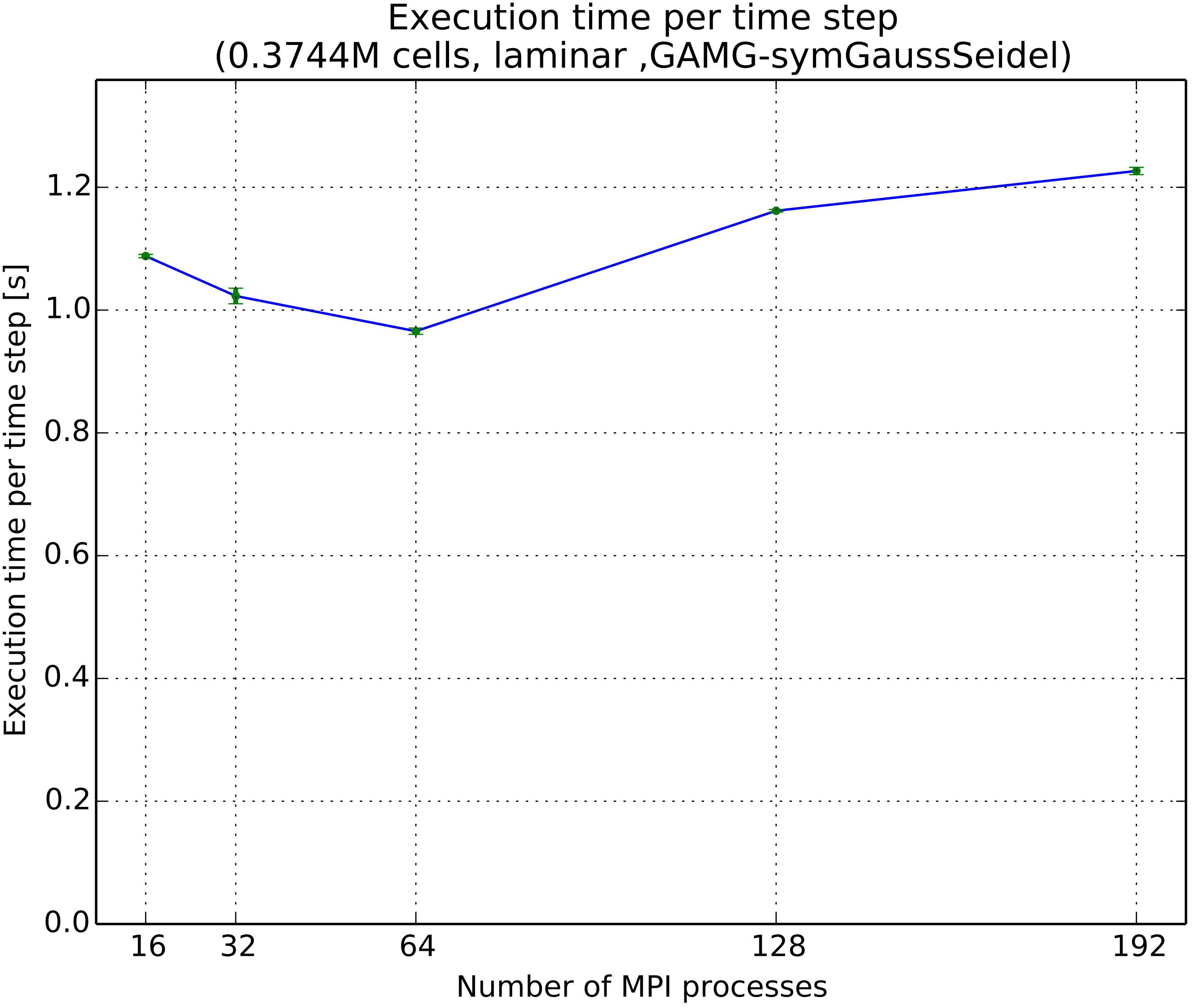

Speedup ratio
(0.3744M cells, laminar ,GAMG-GaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

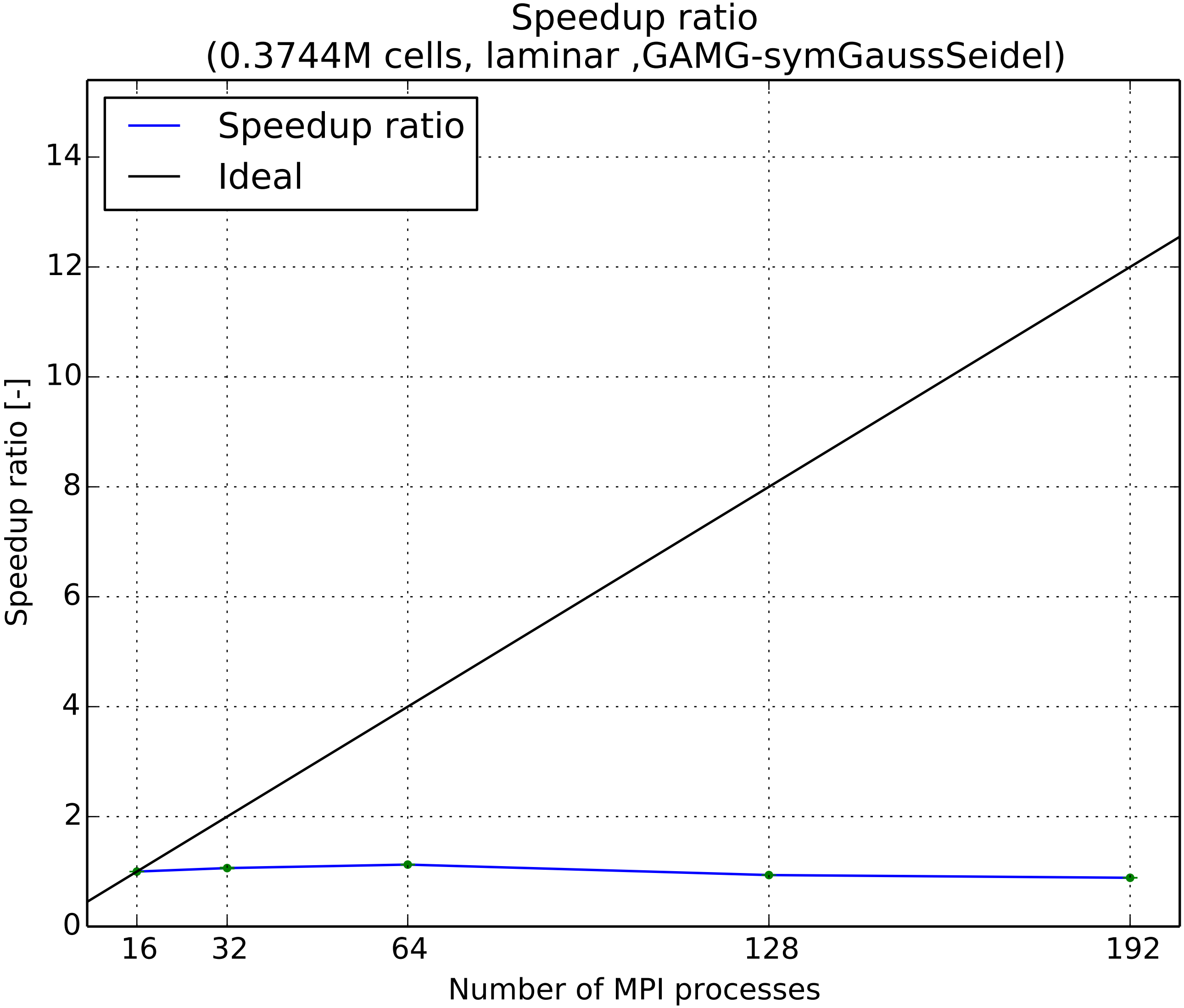

Parallel efficiency
(0.3744M cells, laminar ,GAMG-GaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes

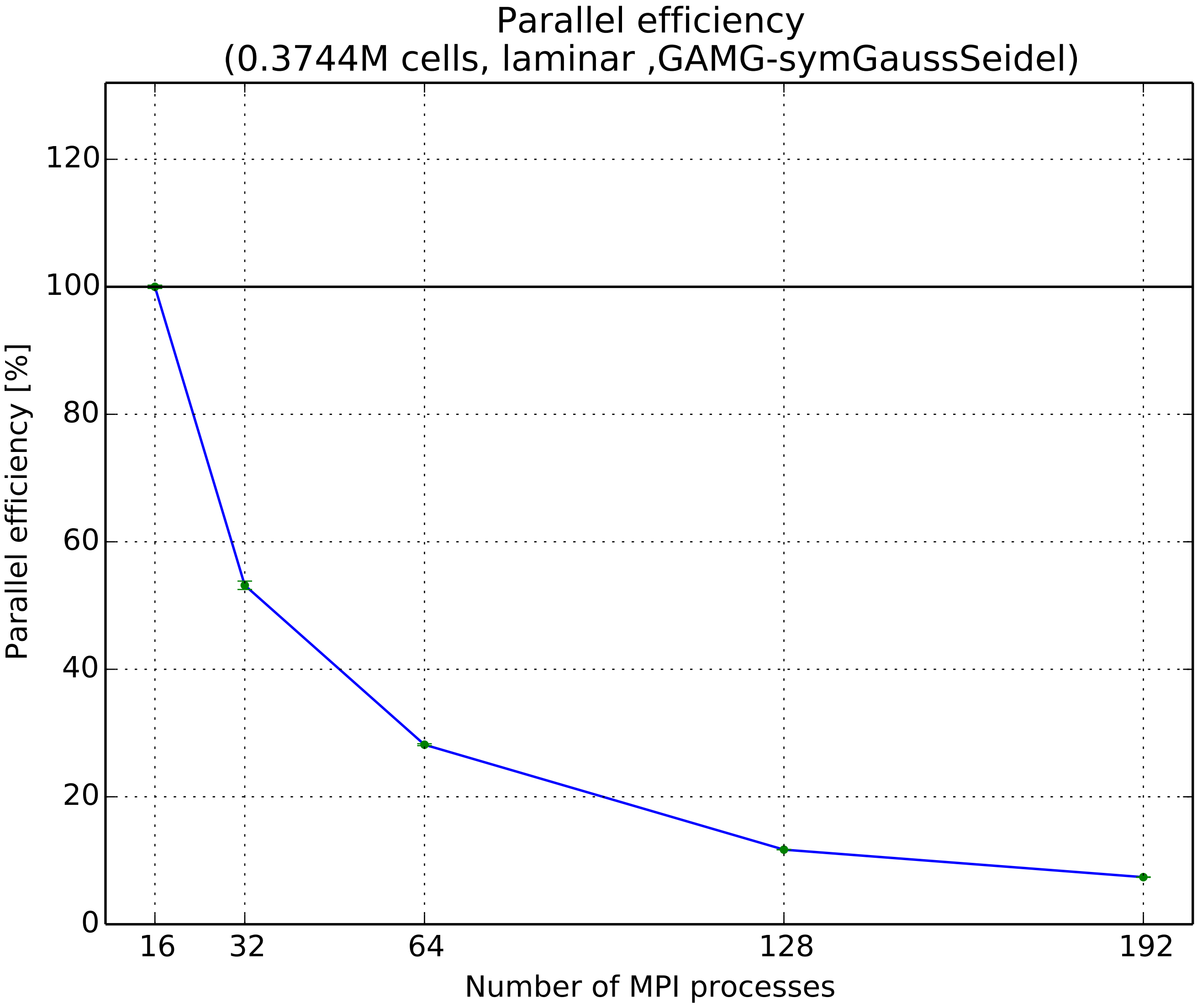

Execution time per time step
(0.3744M cells, laminar ,GAMG-nonBlockingGaussSeidel)
Execution time per time step [s]
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
16
32
64
128
192
Number of MPI processes

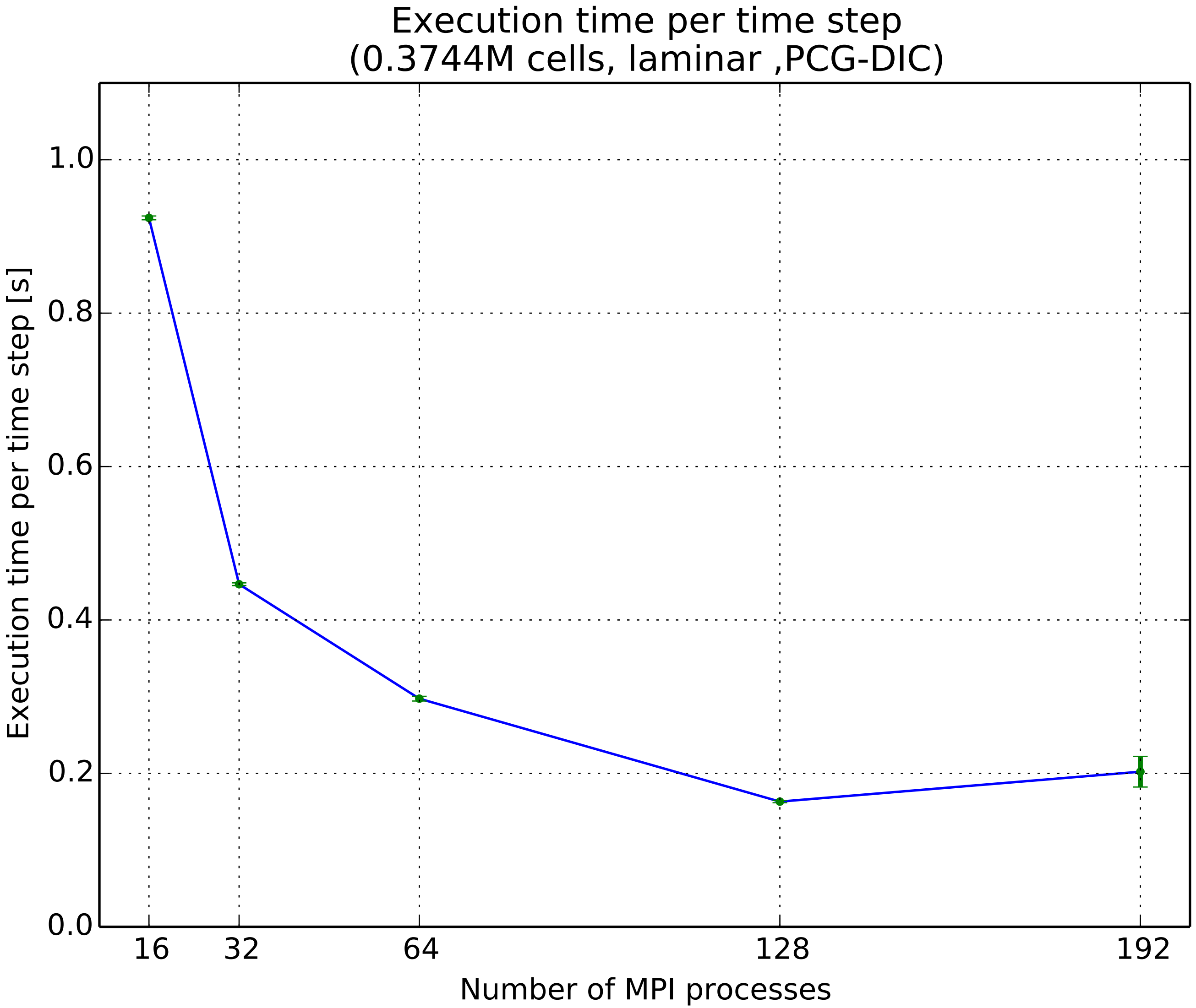

Speedup ratio
(0.3744M cells, laminar ,GAMG-nonBlockingGaussSeidel)
Speedup ratio
Ideal
0
2
4
6
8
10
12
14
16
32
64
128
192
Speedup ratio [-]
Number of MPI processes

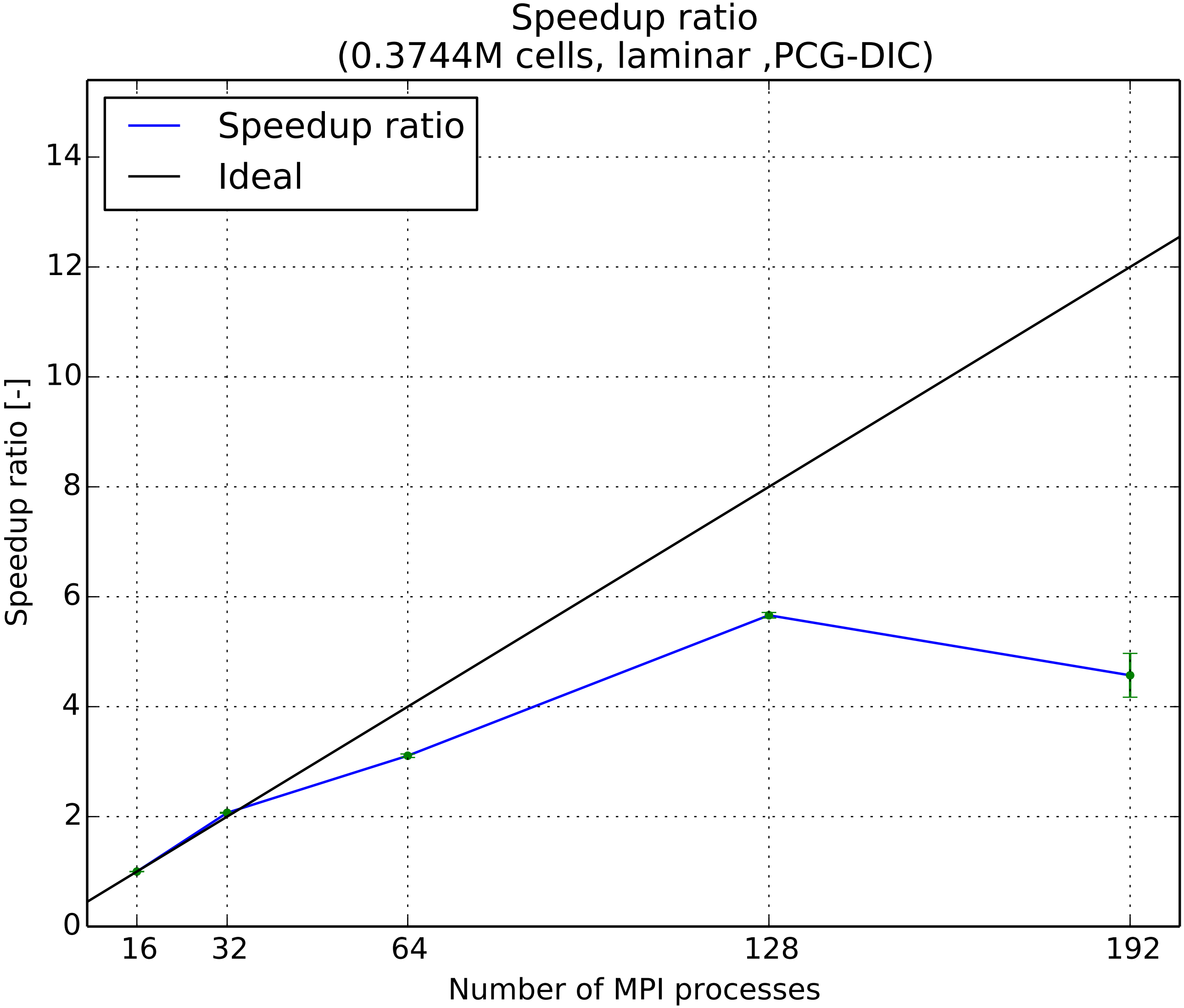

Parallel efficiency
(0.3744M cells, laminar ,GAMG-nonBlockingGaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes

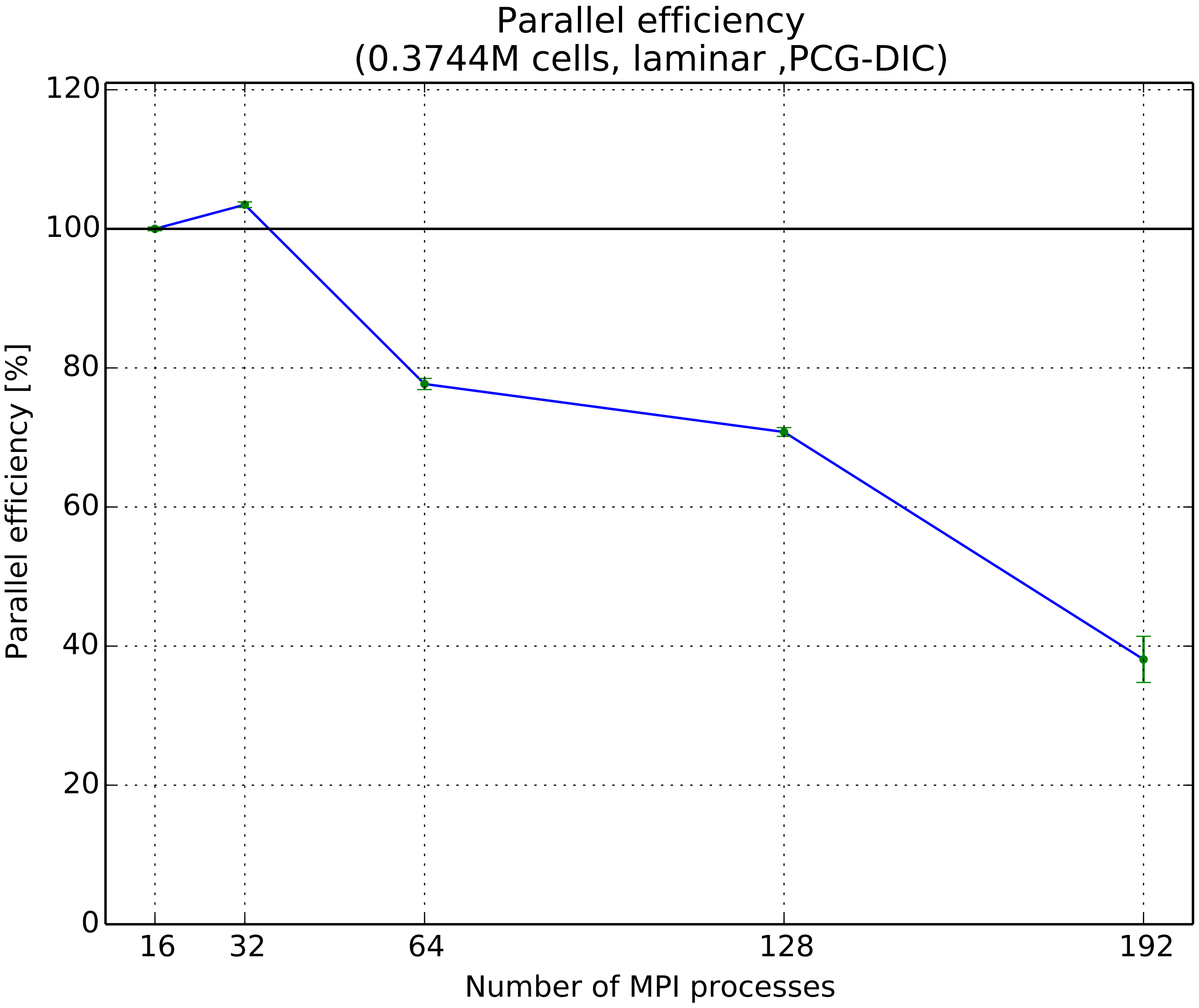

Execution time per time step
(0.3744M cells, laminar ,GAMG-symGaussSeidel)
Execution time per time step [s]
0.0
0.2
0.4
0.6
0.8
1.0
1.2
16
32
64
128
192
Number of MPI processes

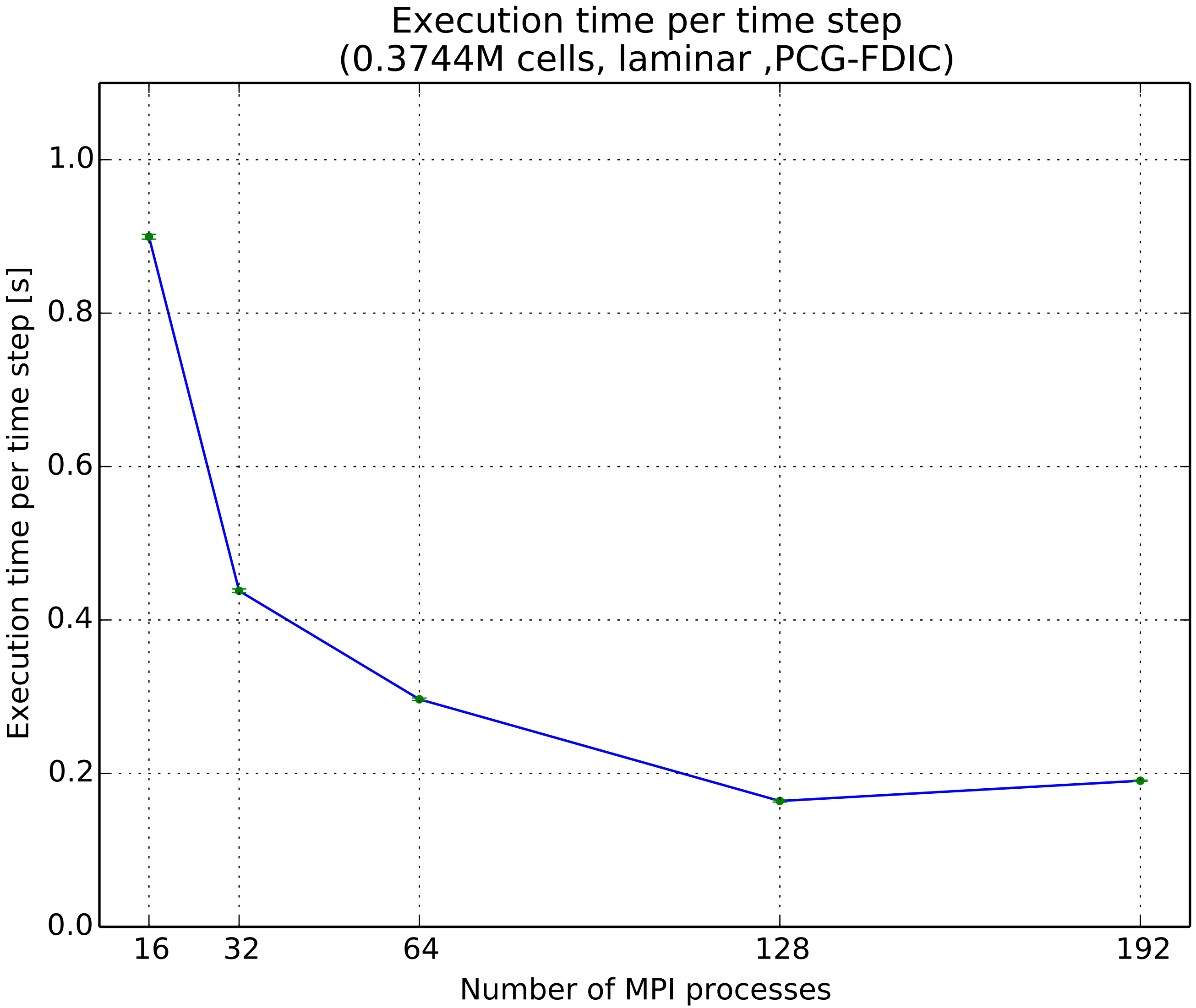

Speedup ratio
(0.3744M cells, laminar ,GAMG-symGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

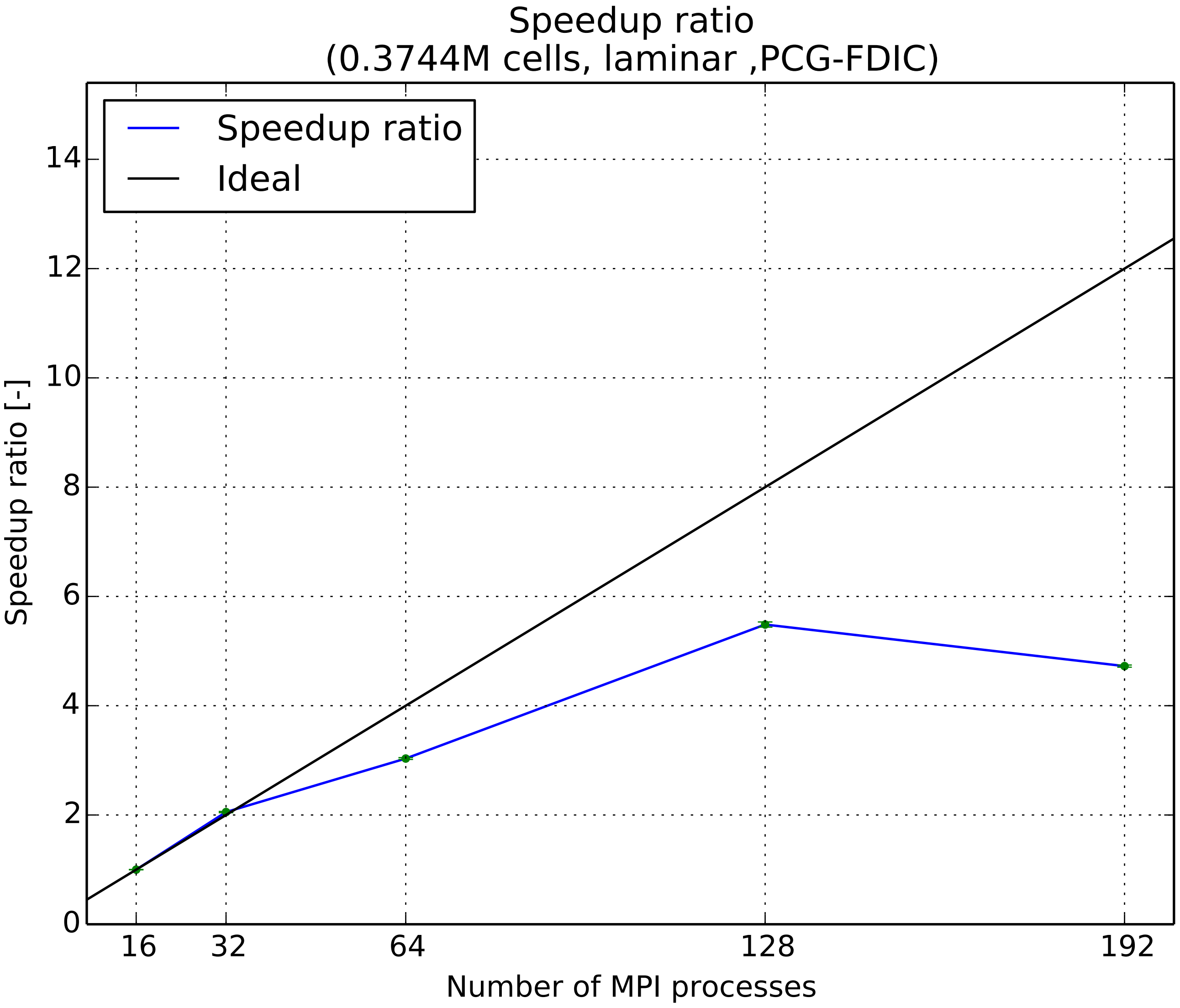

Parallel efficiency
(0.3744M cells, laminar ,GAMG-symGaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes

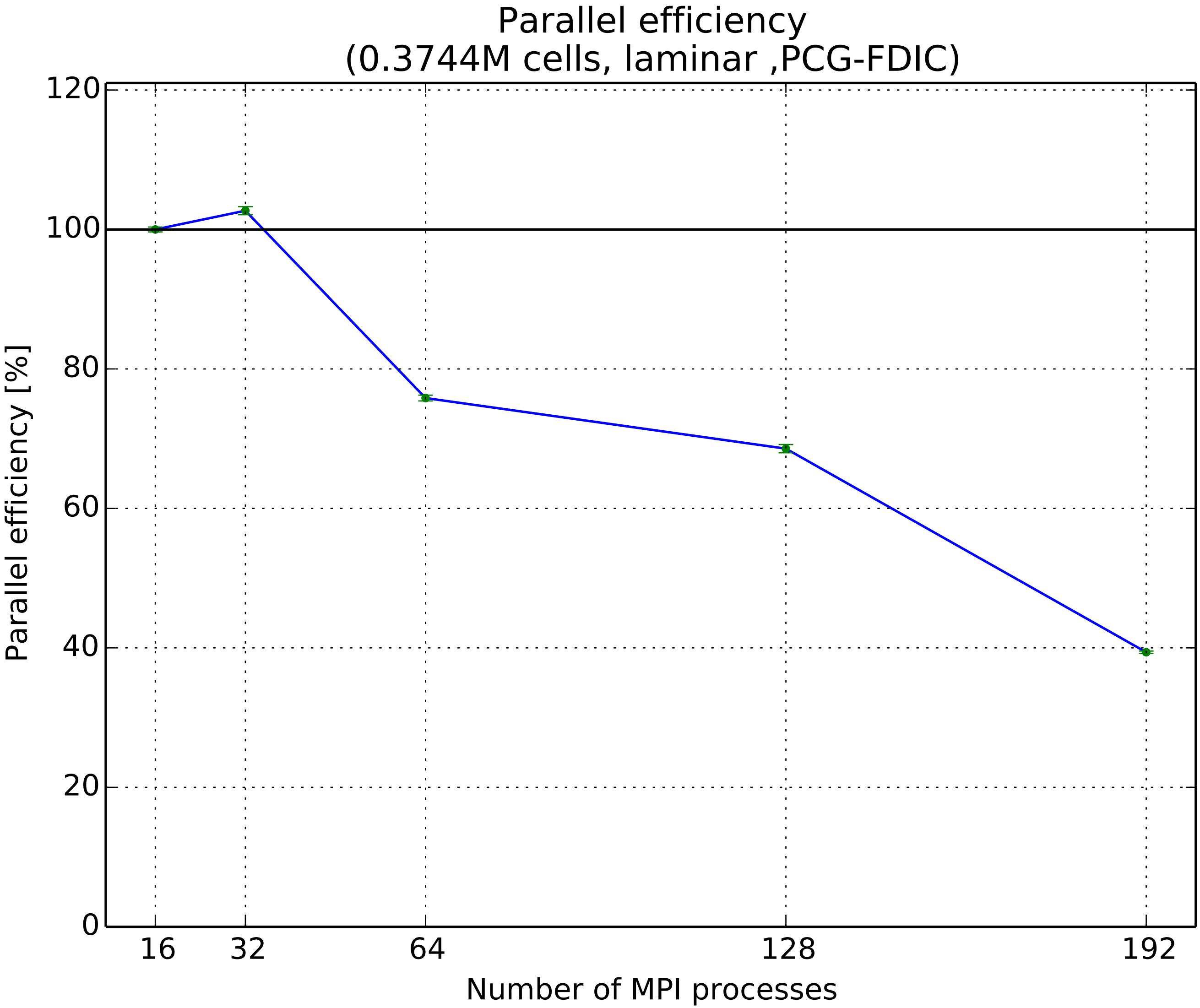

Execution time per time step
(0.3744M cells, laminar ,PCG-DIC)
Execution time per time step [s]
1.0
0.8
0.6
0.4
0.2
0.0
16
32
64
128
192
Number of MPI processes

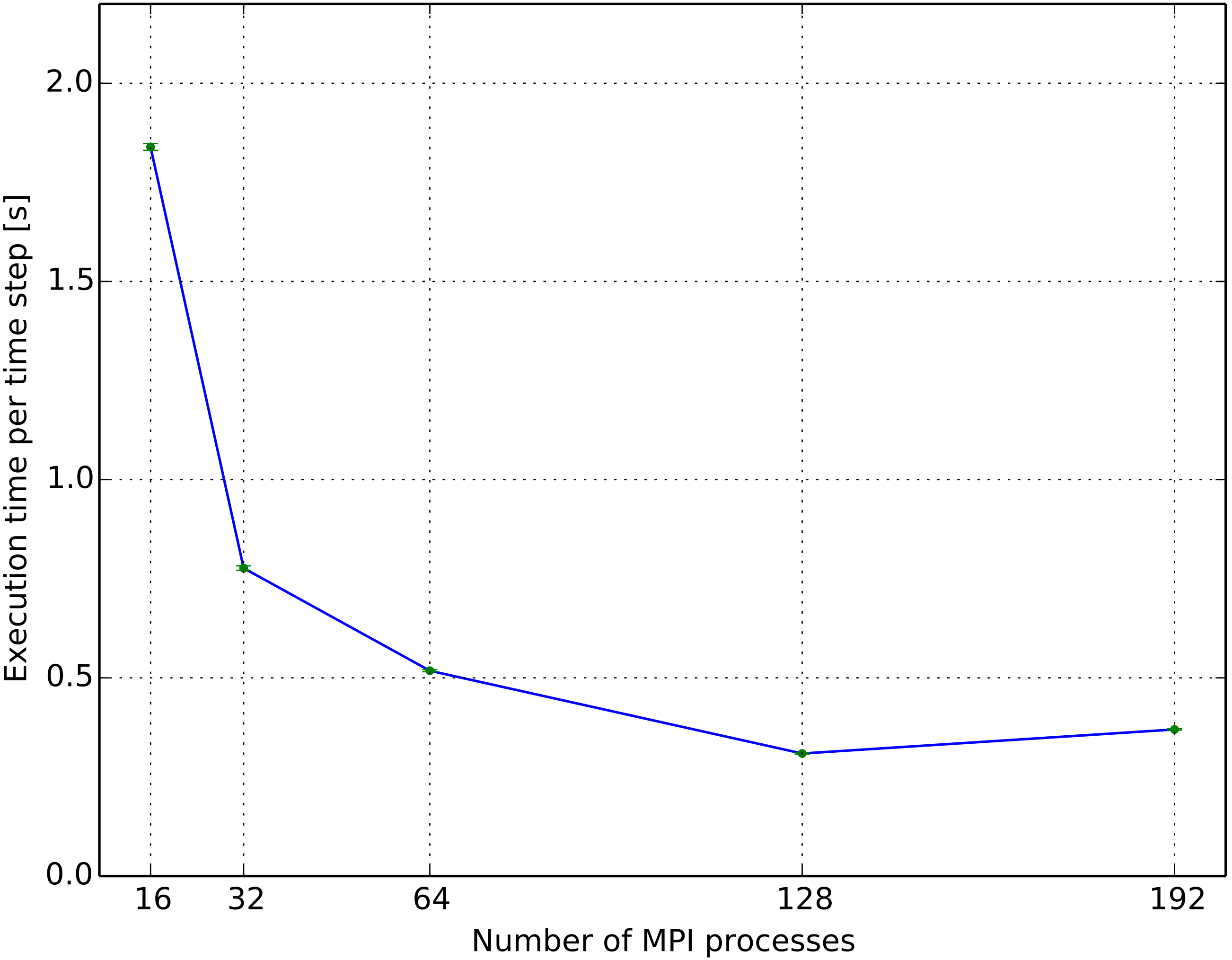

Speedup ratio
(0.3744M cells, laminar ,PCG-DIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes


Parallel efficiency
(0.3744M cells, laminar ,PCG-DIC)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes

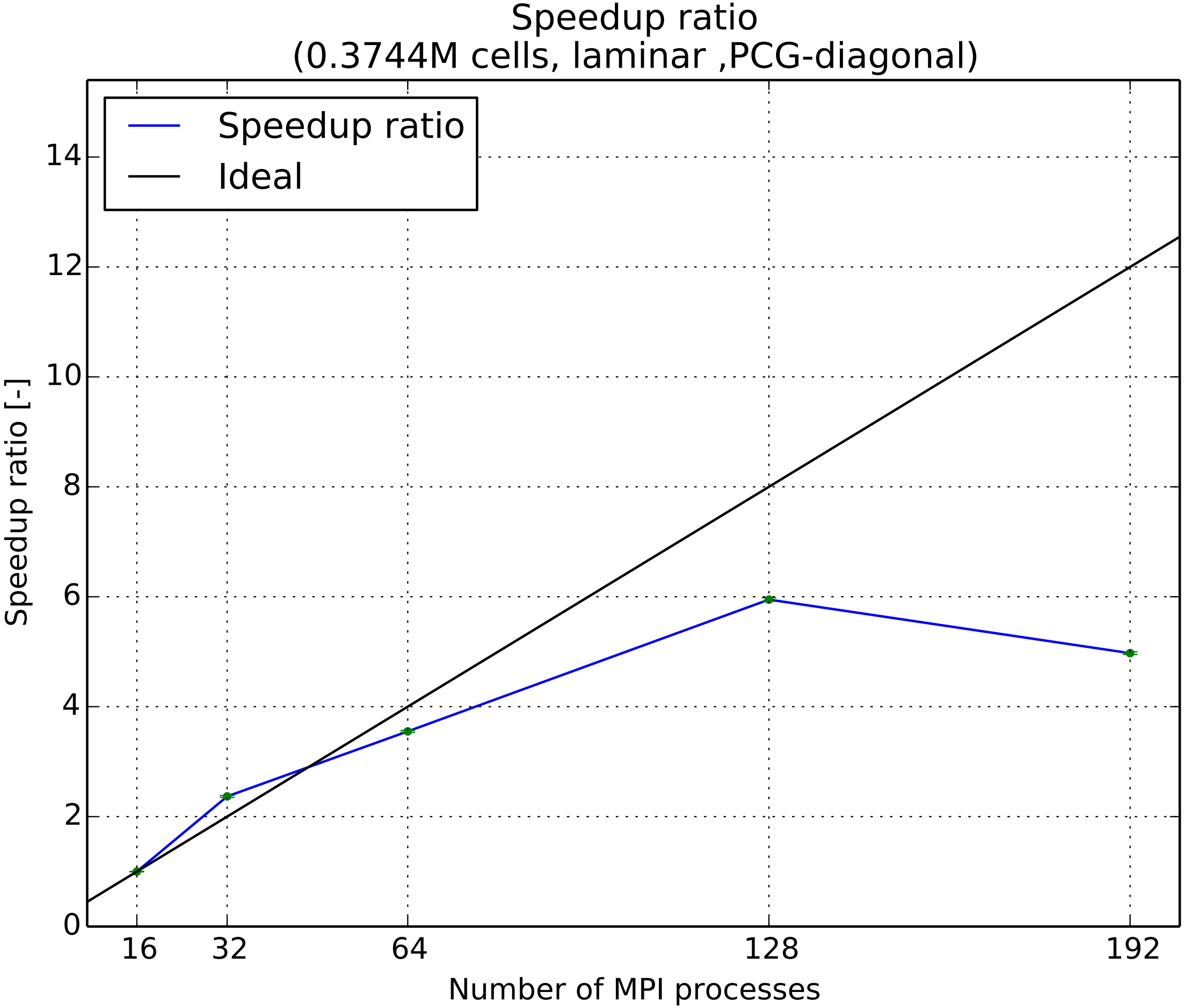

Execution time per time step
(0.3744M cells, laminar ,PCG-FDIC)
Execution time per time step [s]
Number of MPI processes
0.0
0.2
0.4
0.6
0.8
1.0
16
32
64
128
192

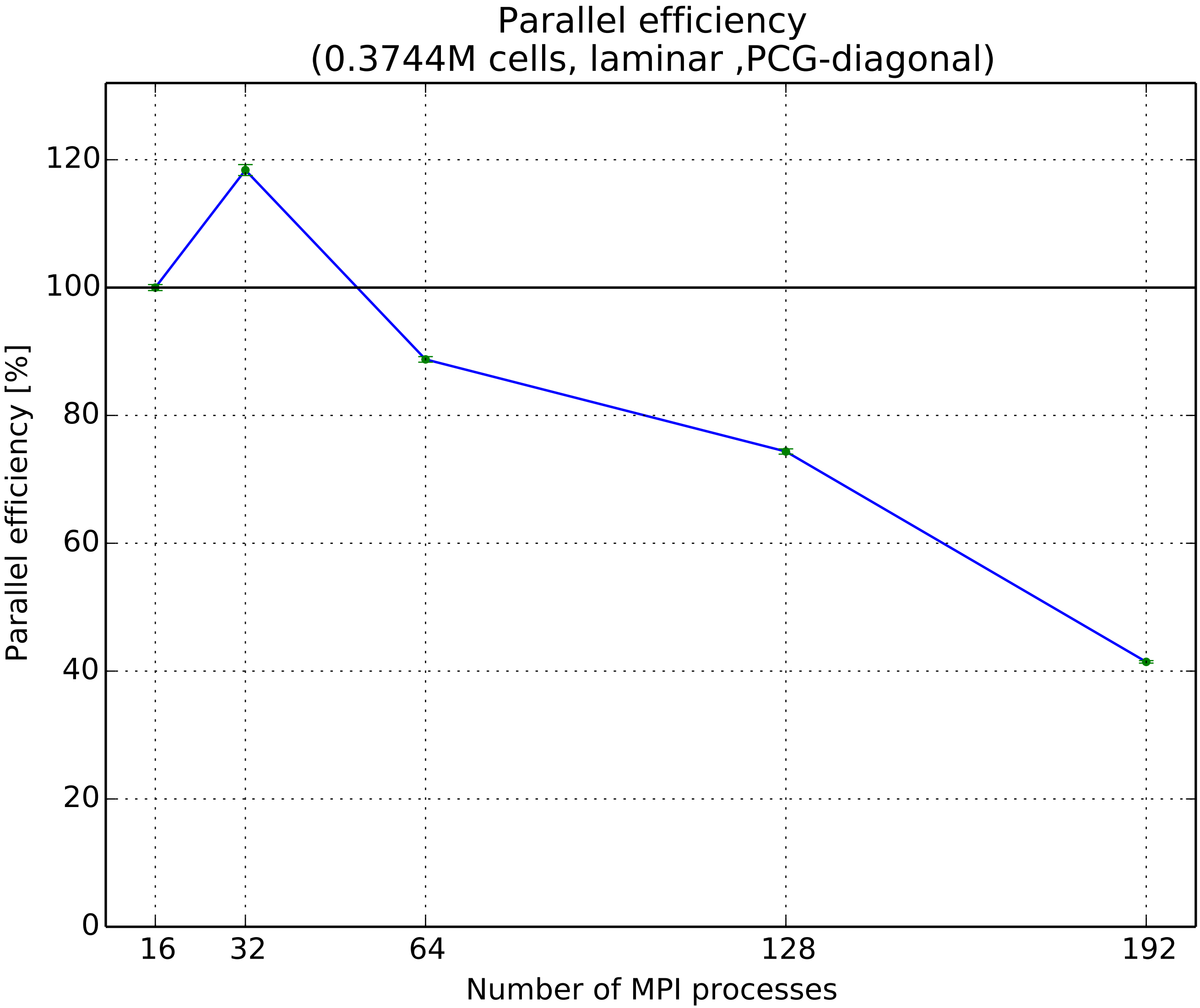

Speedup ratio
(0.3744M cells, laminar ,PCG-FDIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

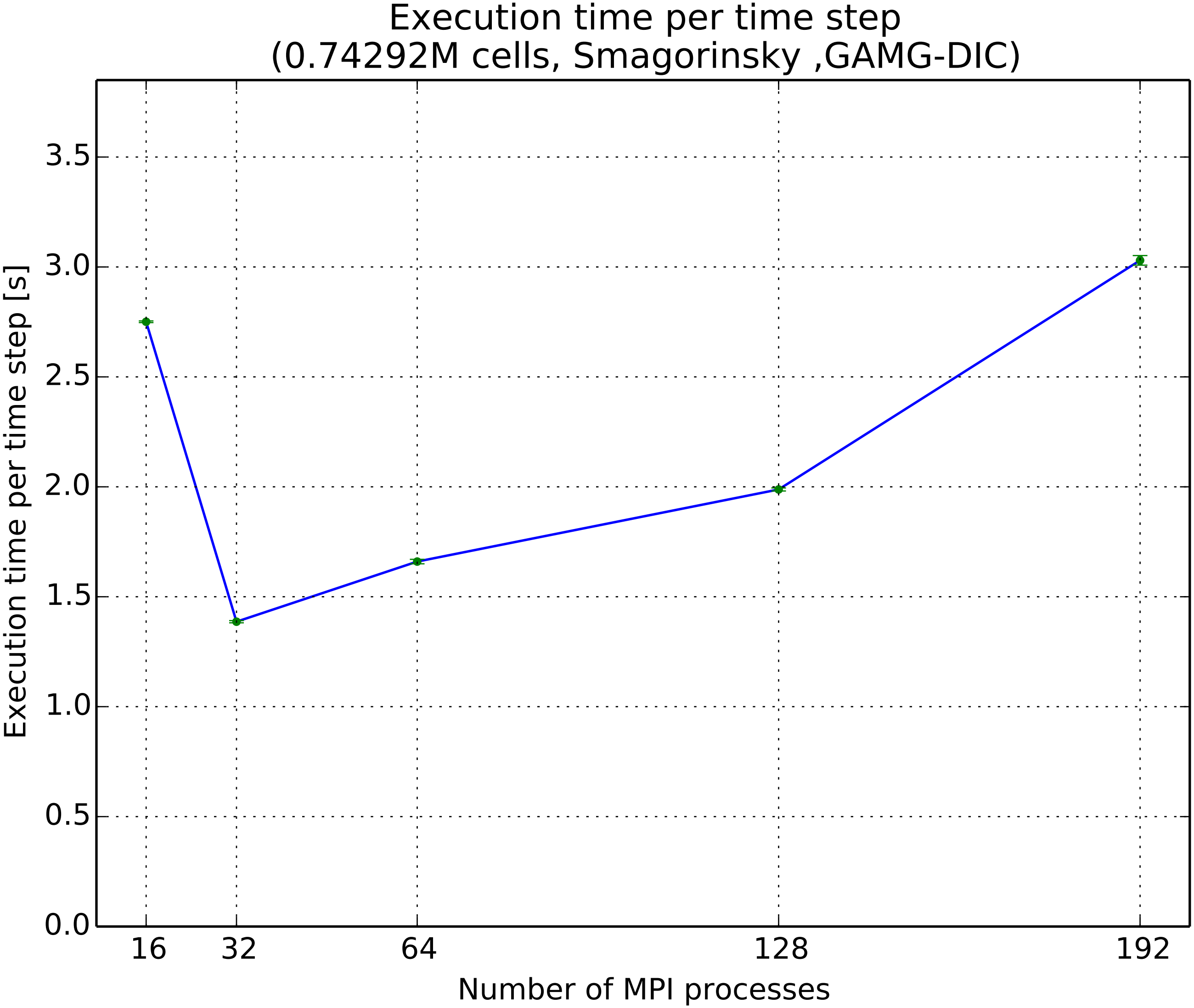

Parallel efficiency
(0.3744M cells, laminar ,PCG-FDIC)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes

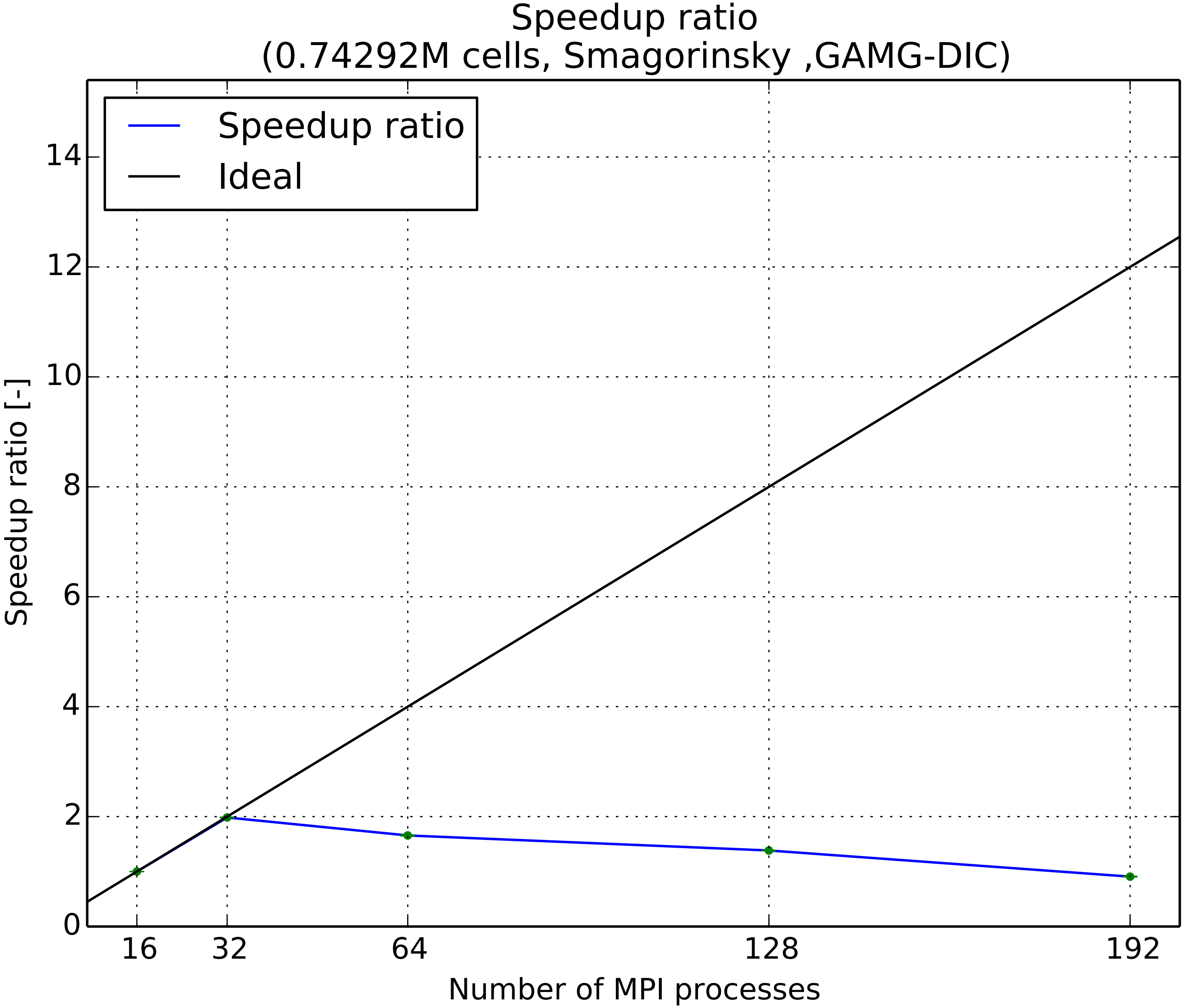


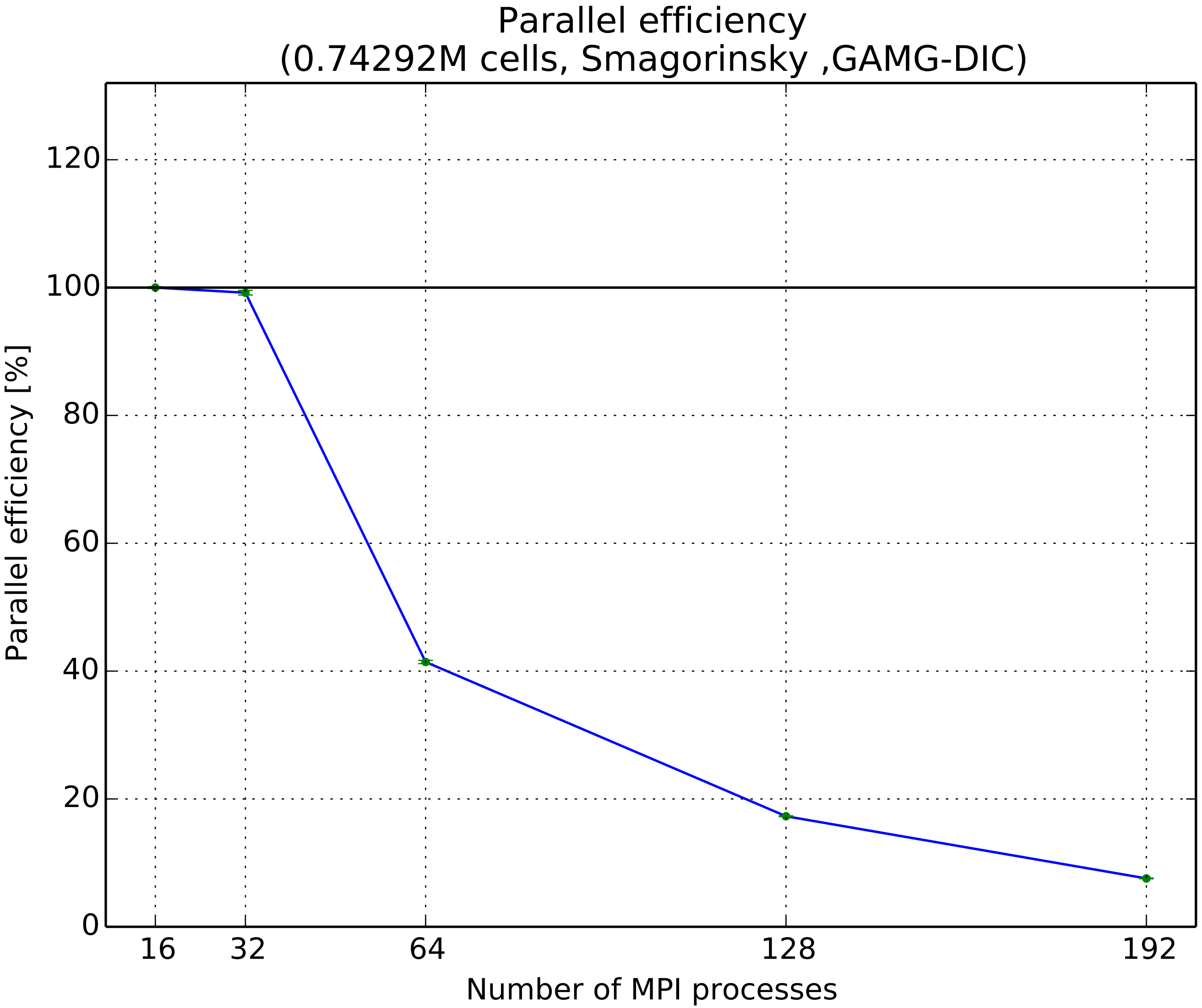
Execution time per time step
(0.3744M cells, laminar ,PCG-diagonal)

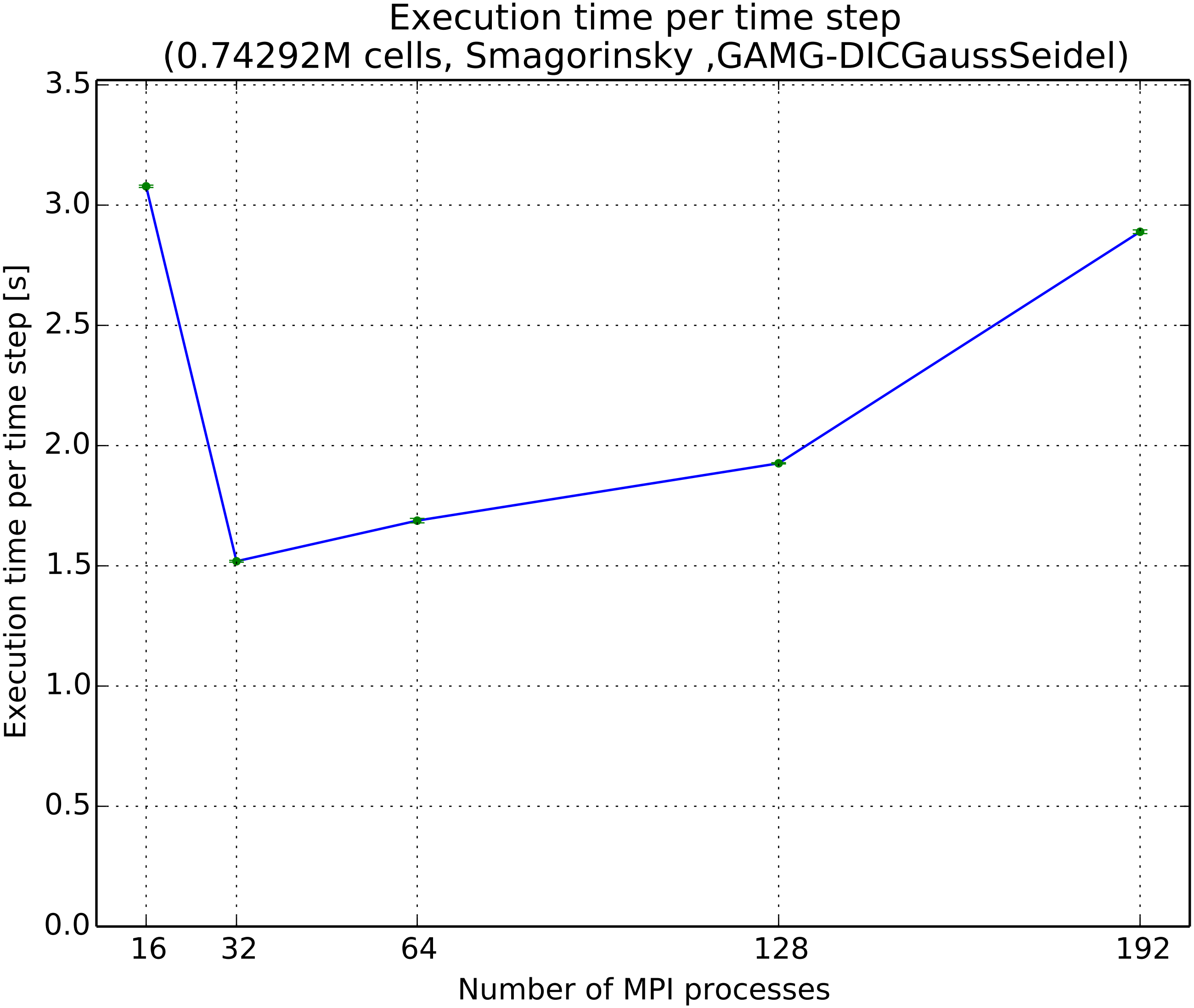

Speedup ratio
(0.3744M cells, laminar ,PCG-diagonal)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

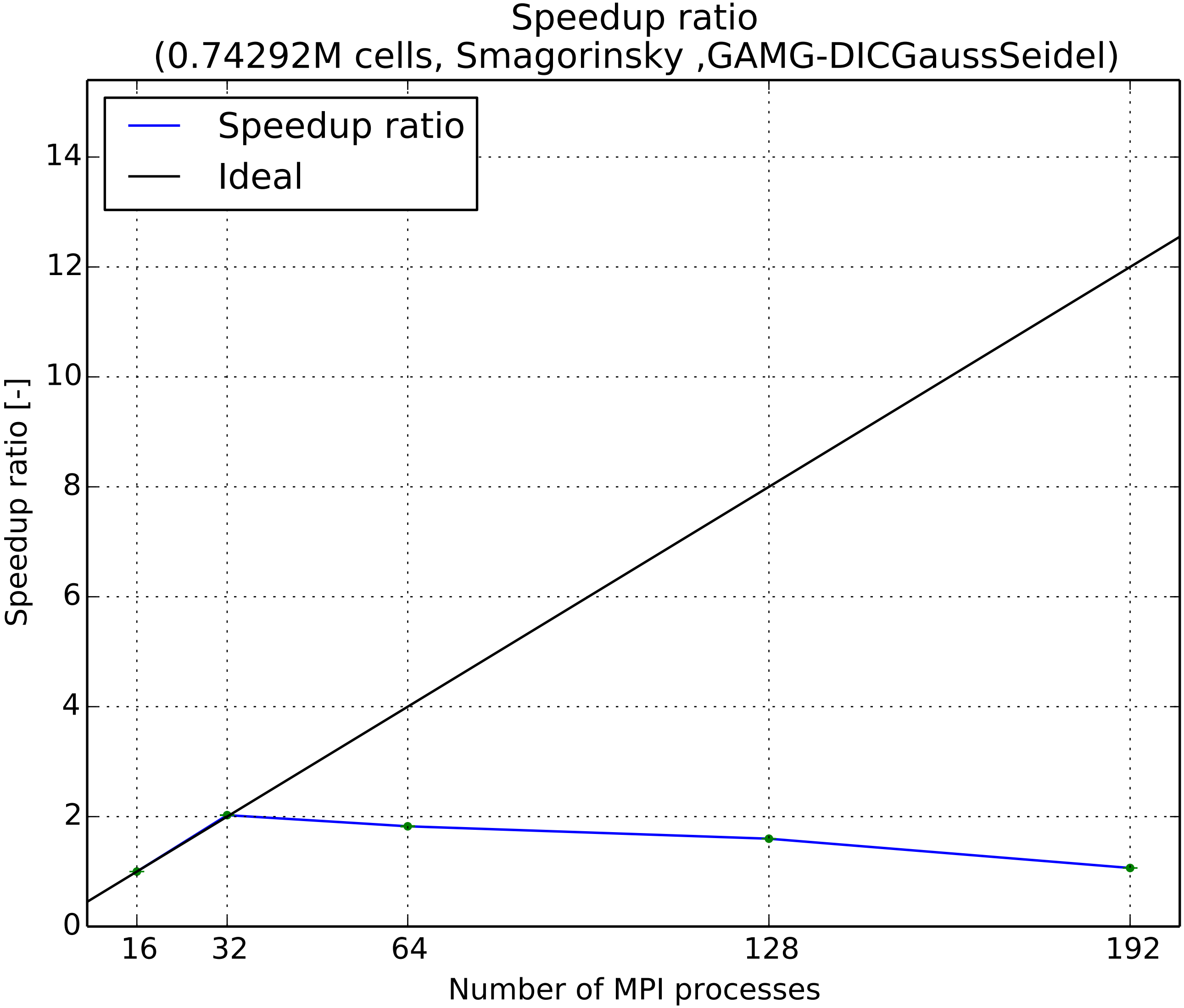

Parallel efficiency
(0.3744M cells, laminar ,PCG-diagonal)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes

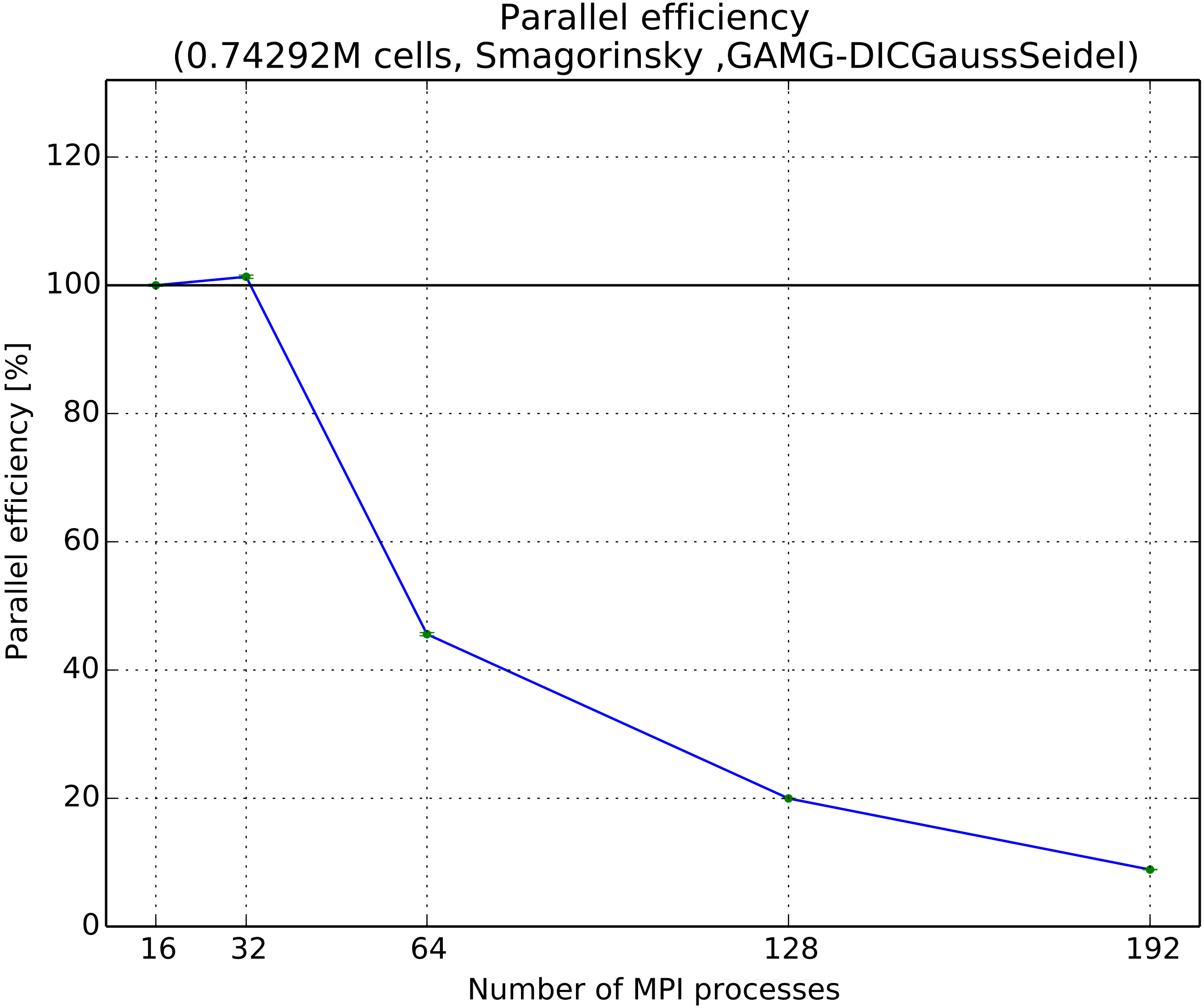

Execution time per time step
(0.74292M cells, Smagorinsky ,GAMG-DIC)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
16
32
64
128
192
Number of MPI processes

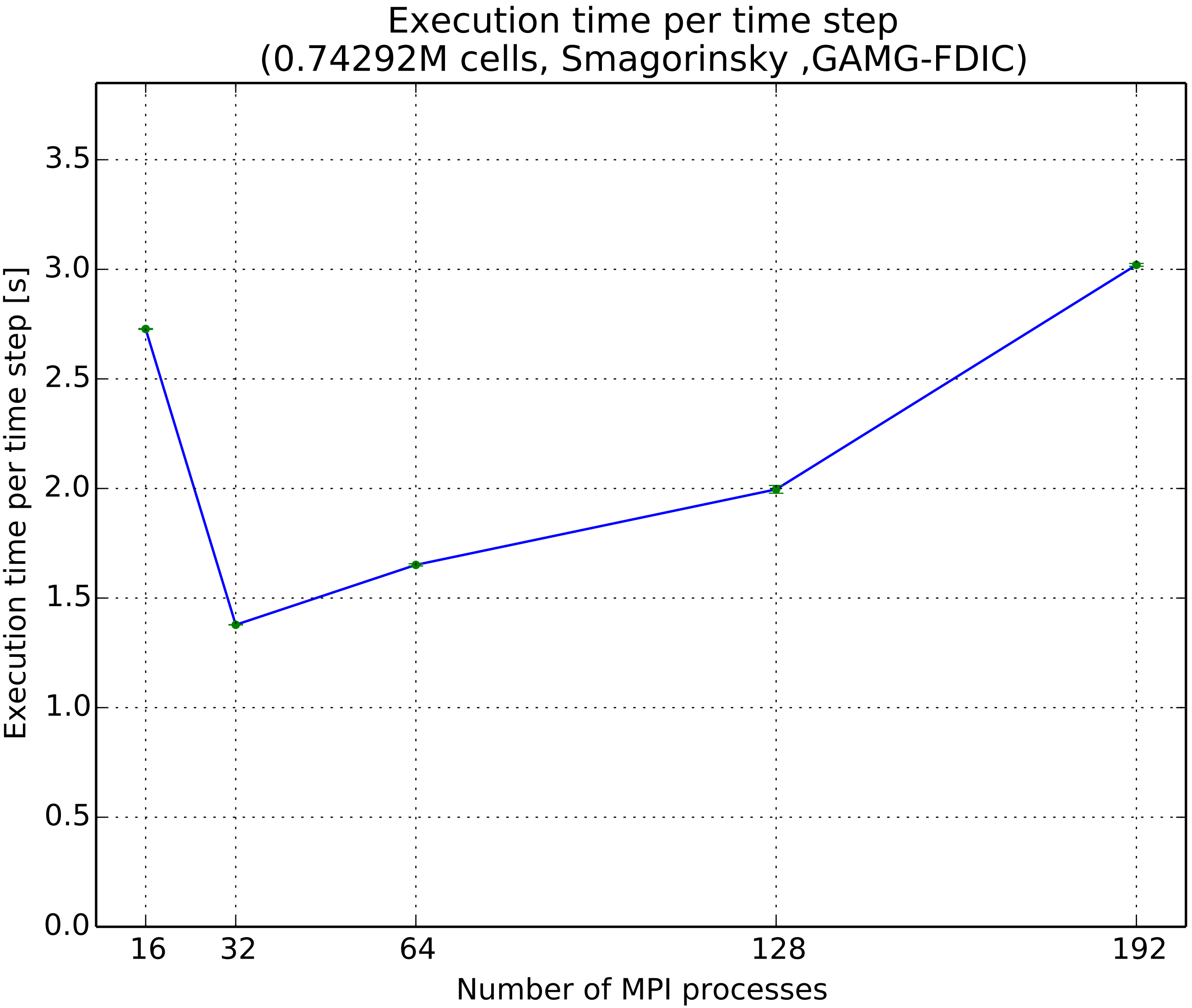

Speedup ratio
(0.74292M cells, Smagorinsky ,GAMG-DIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

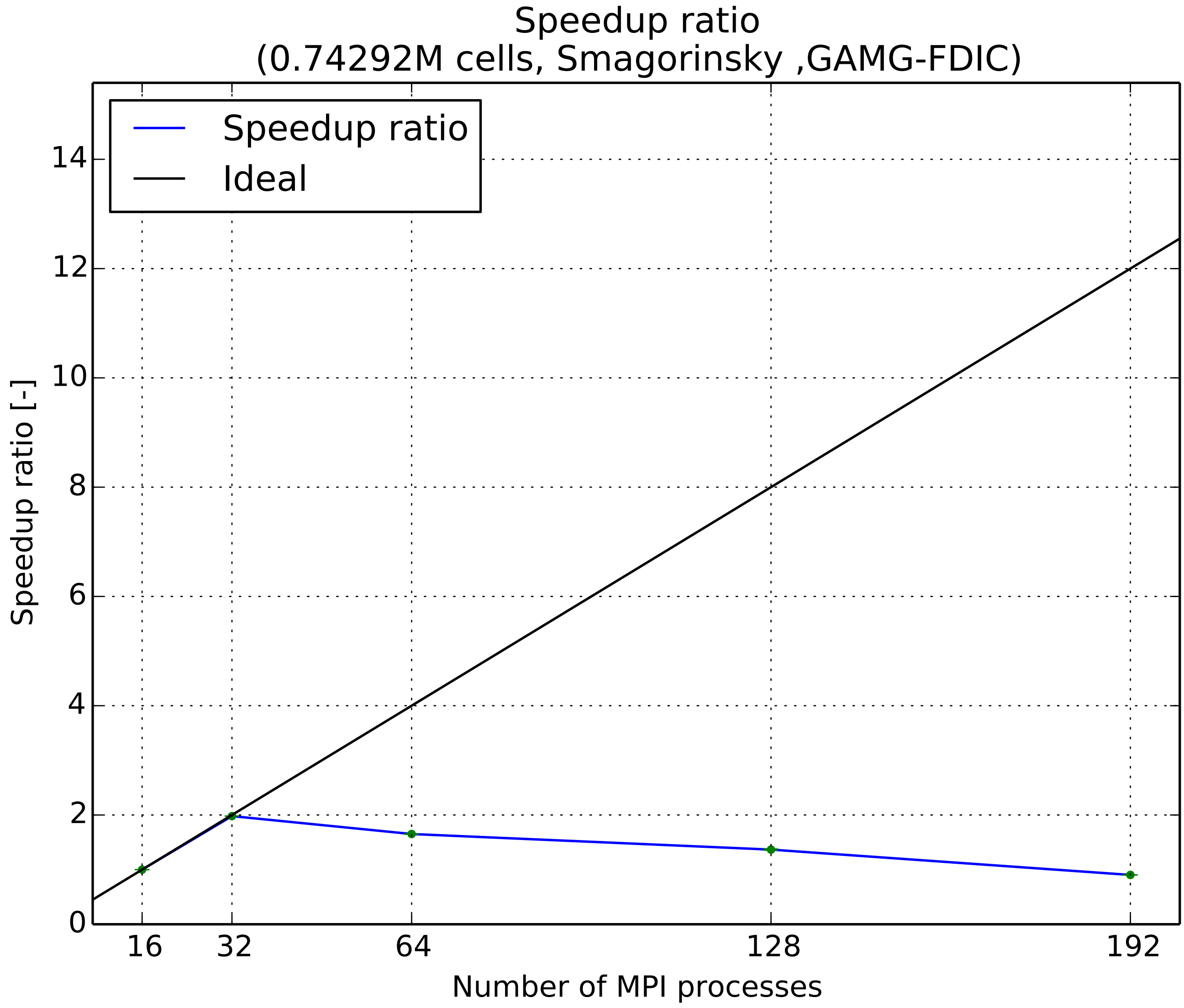

Parallel efficiency
(0.74292M cells, Smagorinsky ,GAMG-DIC)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes


Execution time per time step
(0.74292M cells, Smagorinsky ,GAMG-DICGaussSeidel)
Execution time per time step [s]
Number of MPI processes
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
16
32
64
128
192


Speedup ratio
(0.74292M cells, Smagorinsky ,GAMG-DICGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes


Parallel efficiency
(0.74292M cells, Smagorinsky ,GAMG-DICGaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes


Execution time per time step
(0.74292M cells, Smagorinsky ,GAMG-FDIC)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
16
32
64
128
192
Number of MPI processes


Speedup ratio
(0.74292M cells, Smagorinsky ,GAMG-FDIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
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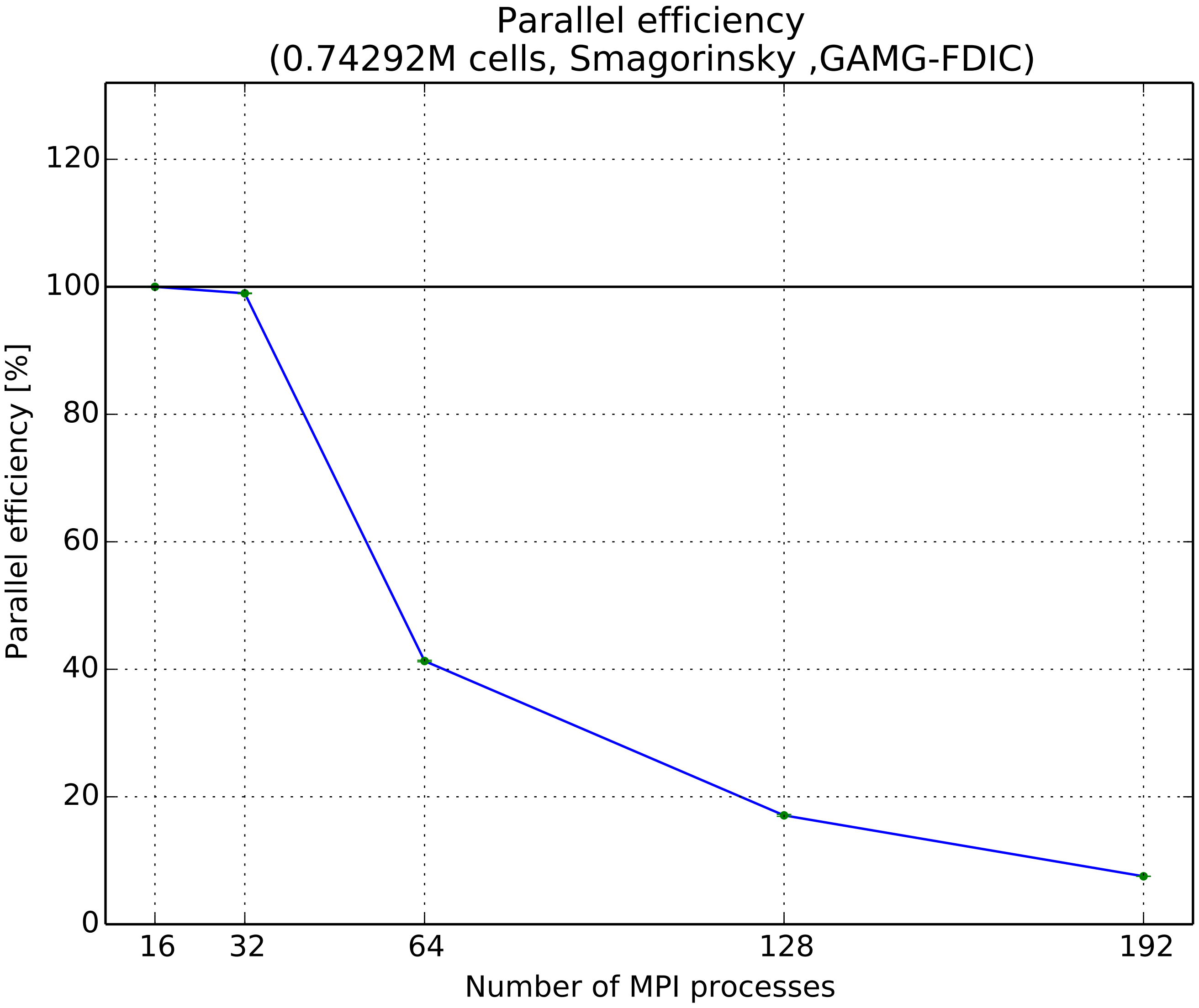
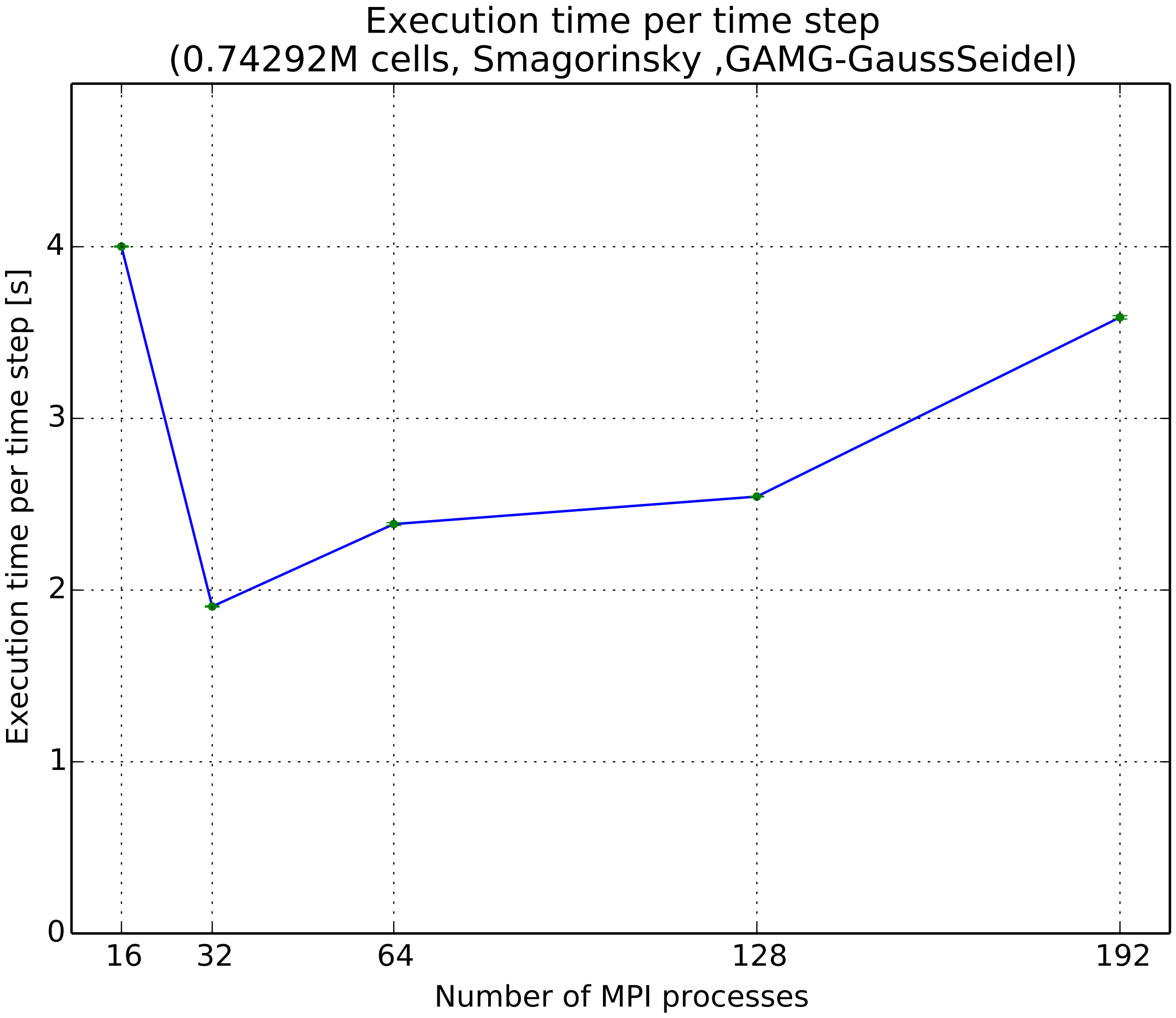
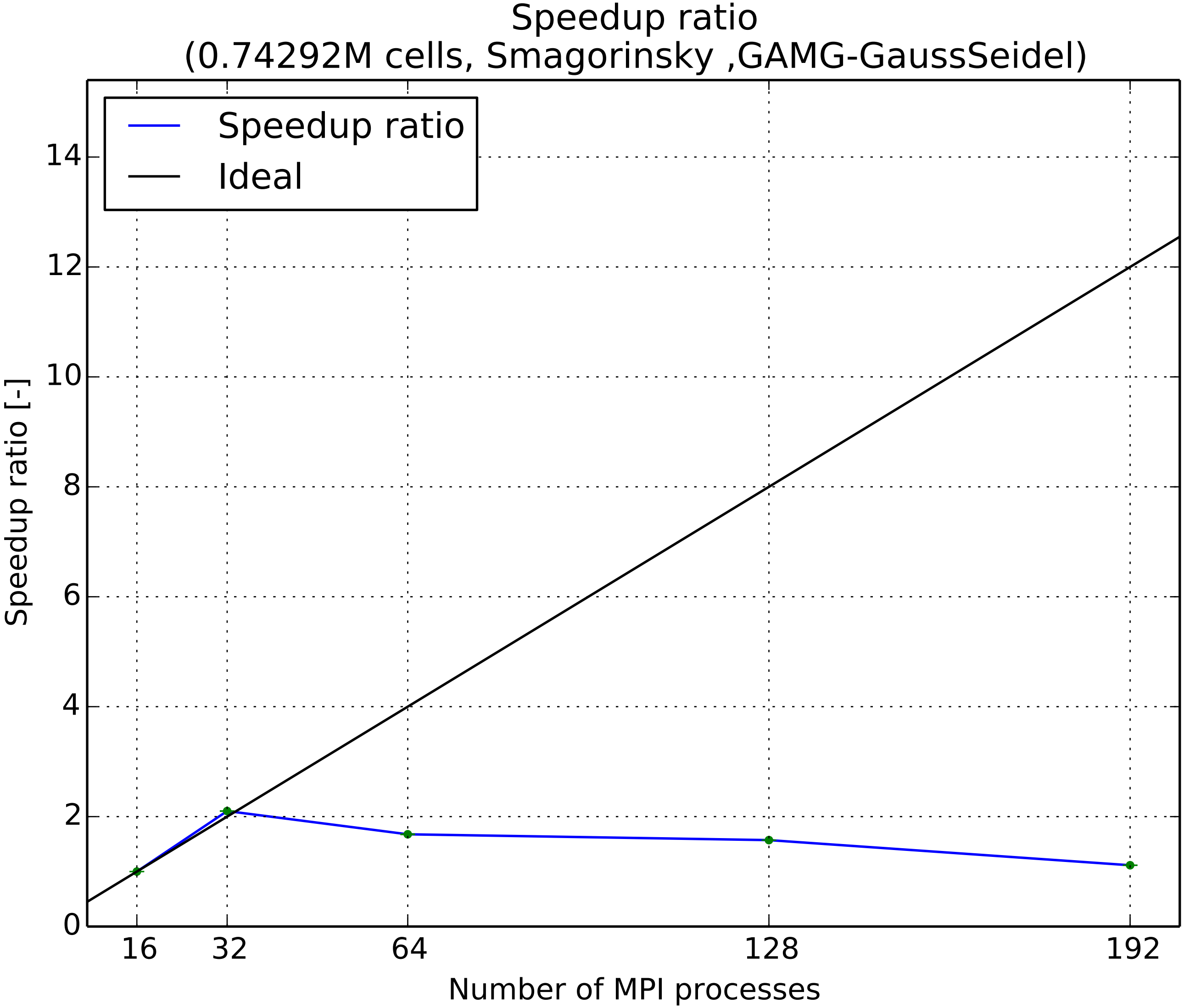
12
14
16
32
64
128
192
Number of MPI processes


Parallel efficiency
(0.74292M cells, Smagorinsky ,GAMG-FDIC)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes


Execution time per time step
(0.74292M cells, Smagorinsky ,GAMG-GaussSeidel)
Execution time per time step [s]
0
1
2
3
4
16
32
64
128
192
Number of MPI processes


Speedup ratio
(0.74292M cells, Smagorinsky ,GAMG-GaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
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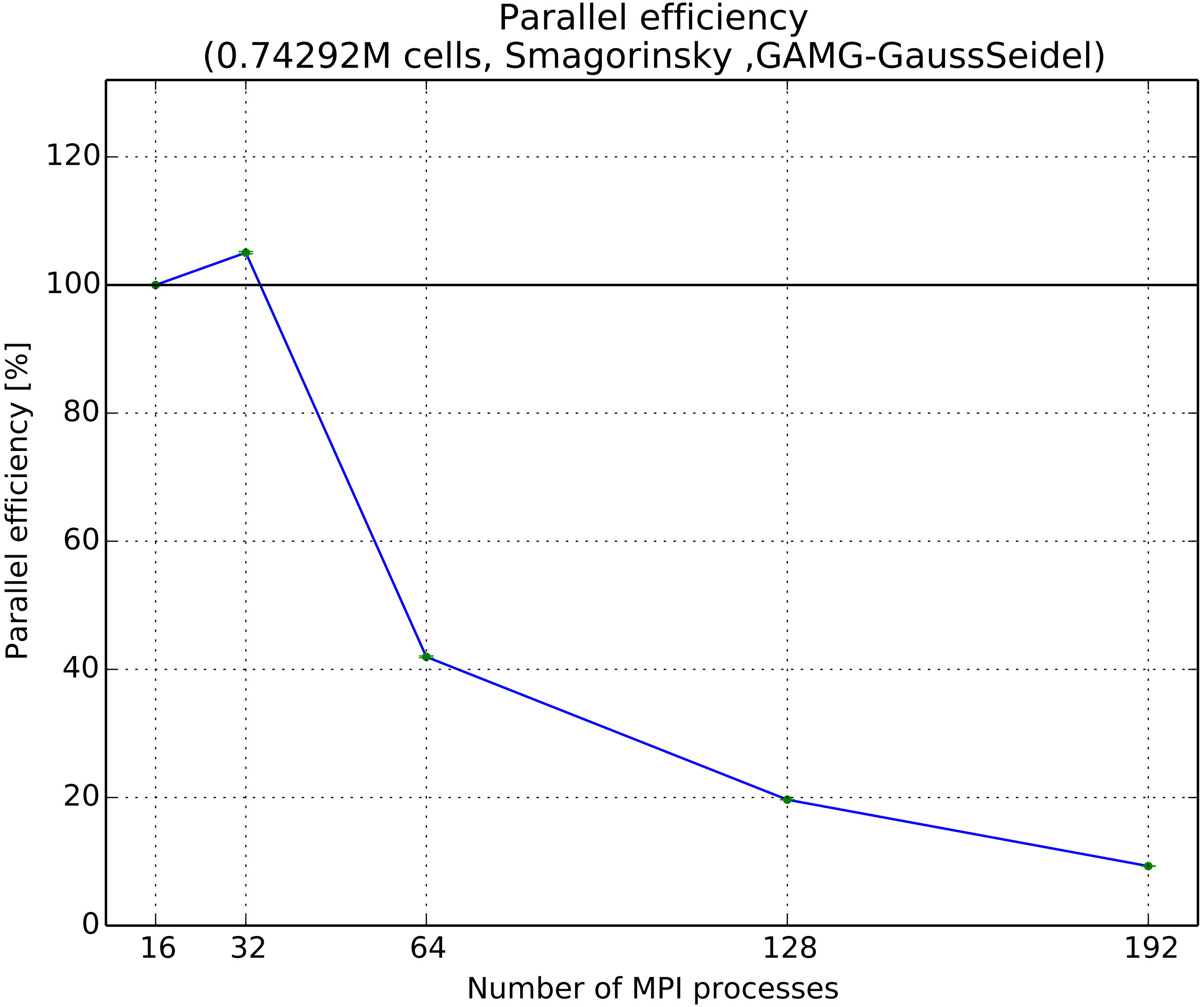
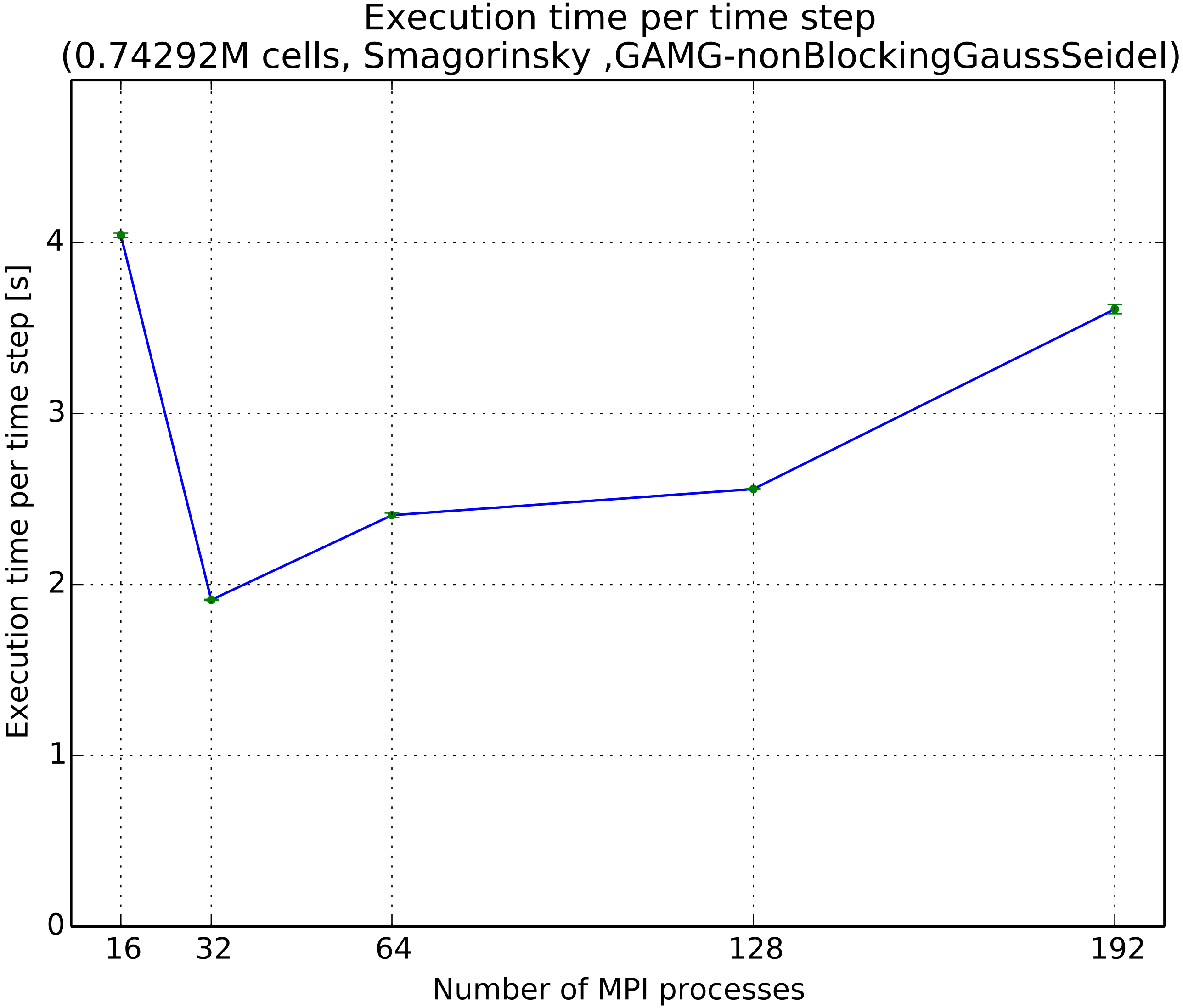
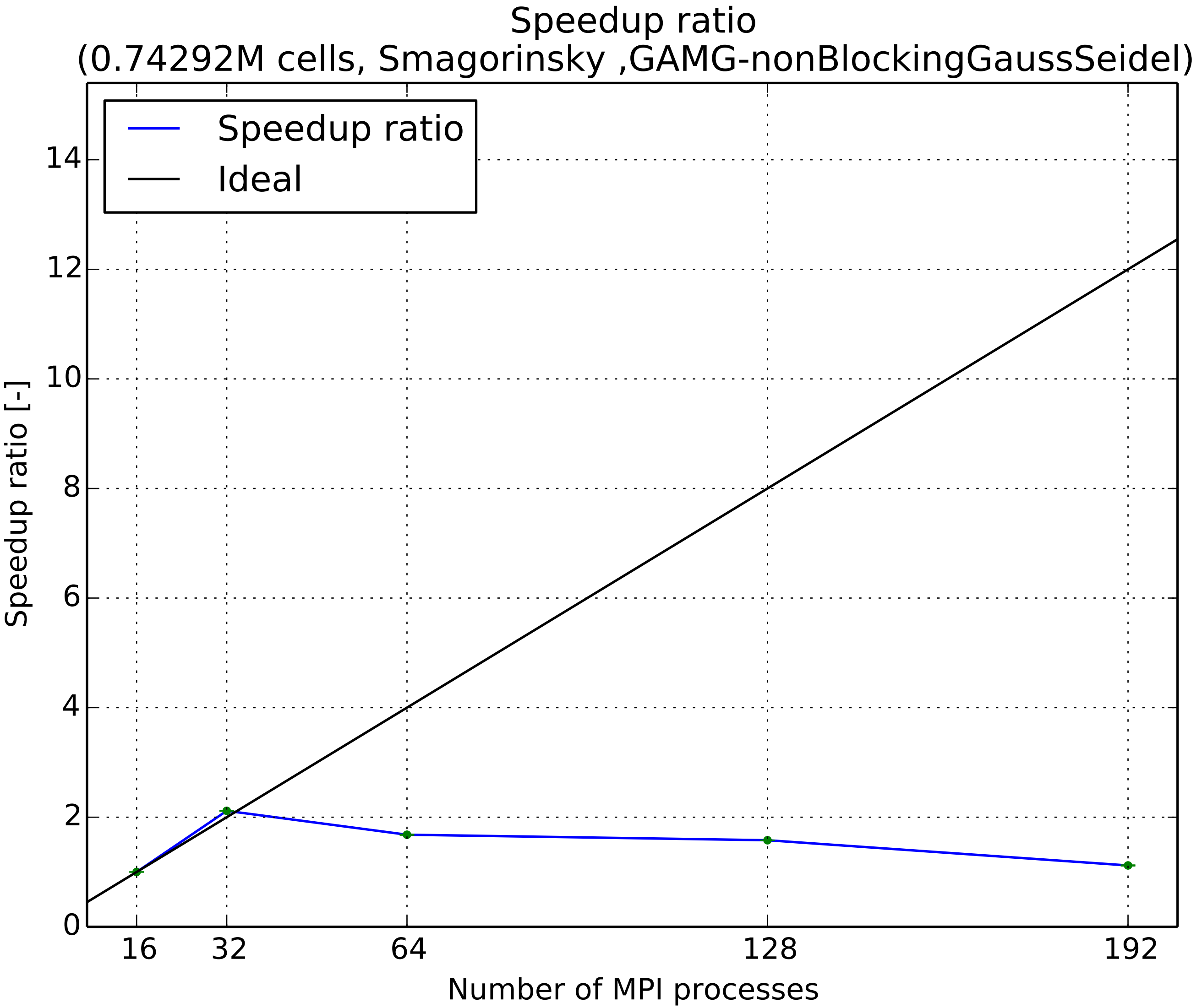
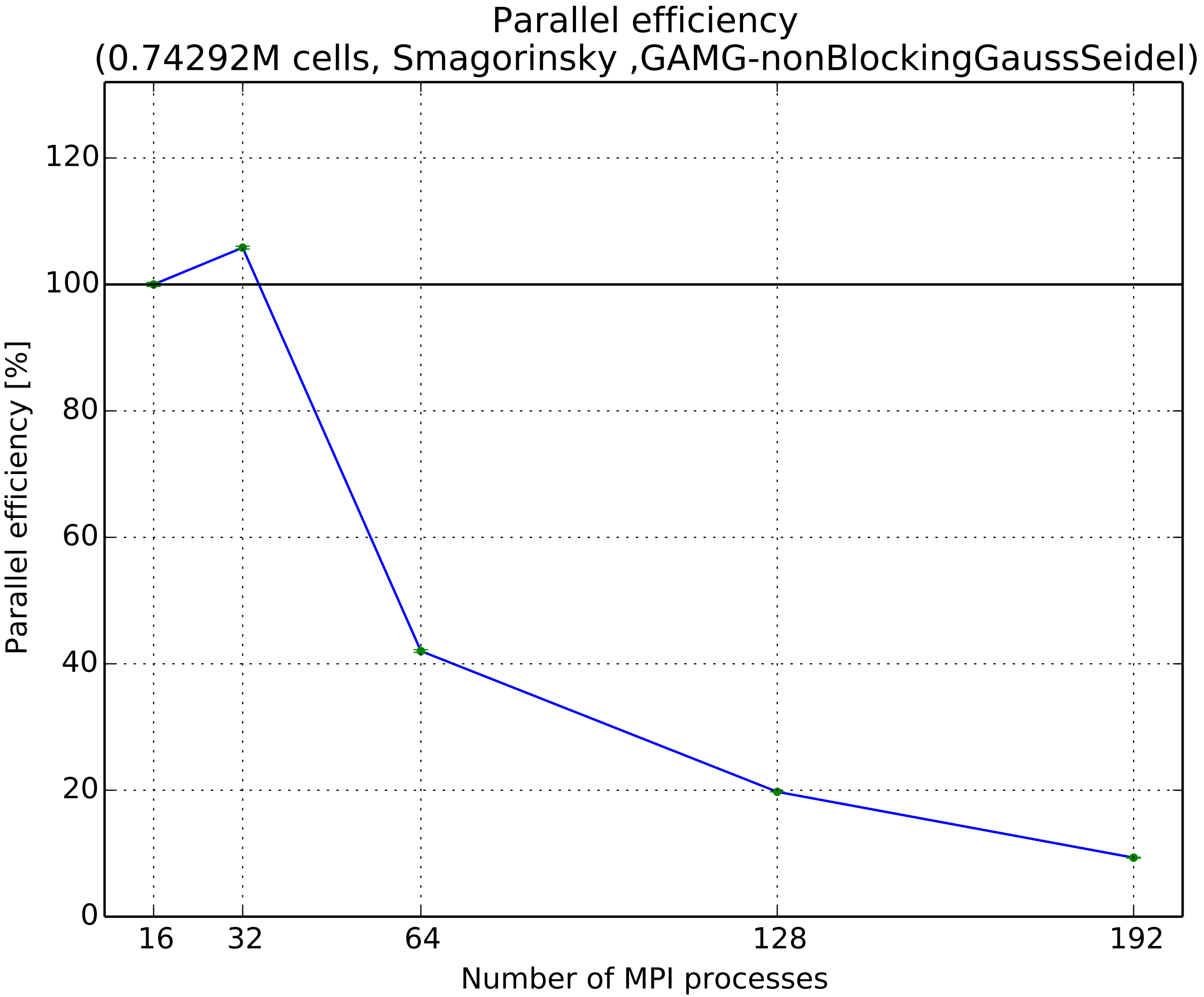
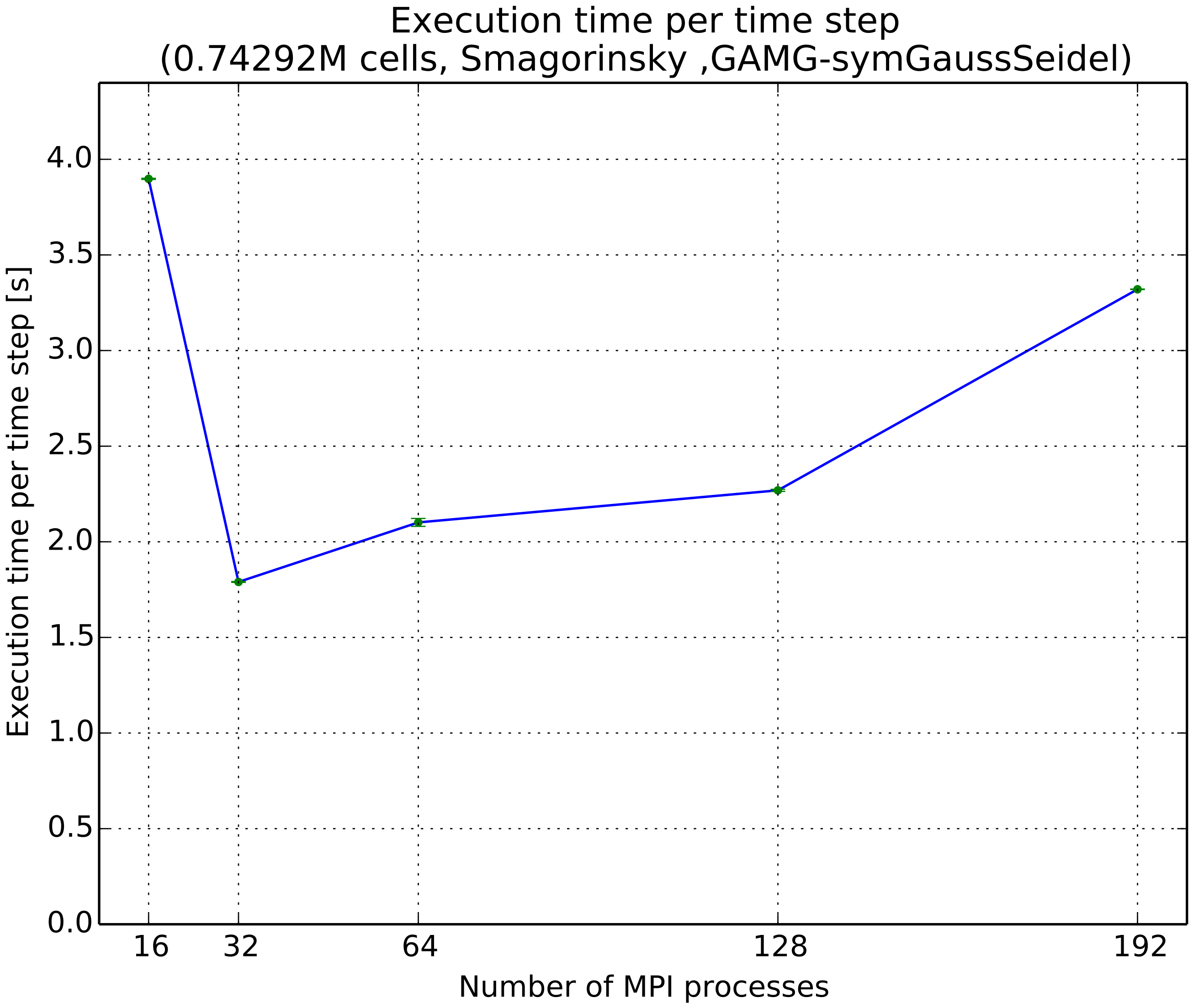
64
128
192
Number of MPI processes

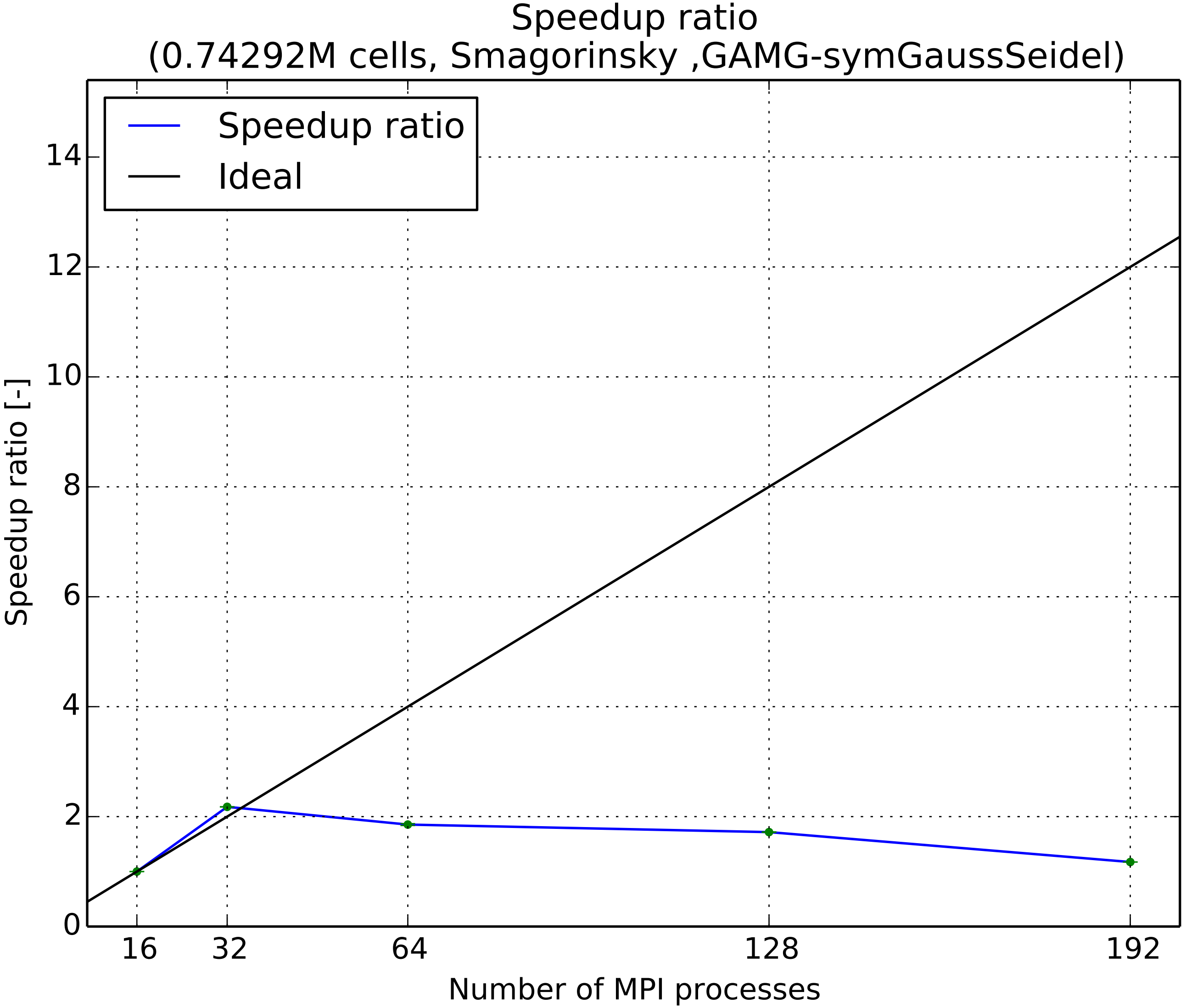

Parallel efficiency
(0.74292M cells, Smagorinsky ,GAMG-GaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes


Execution time per time step
(0.74292M cells, Smagorinsky ,GAMG-nonBlockingGaussSeidel)
Execution time per time step [s]
0
1
2
3
4
16
32
64
128
192
Number of MPI processes


Speedup ratio
(0.74292M cells, Smagorinsky ,GAMG-nonBlockingGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes


Parallel efficiency
(0.74292M cells, Smagorinsky ,GAMG-nonBlockingGaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes


Execution time per time step
(0.74292M cells, Smagorinsky ,GAMG-symGaussSeidel)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
16
32
64
128
192
Number of MPI processes


Speedup ratio
(0.74292M cells, Smagorinsky ,GAMG-symGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
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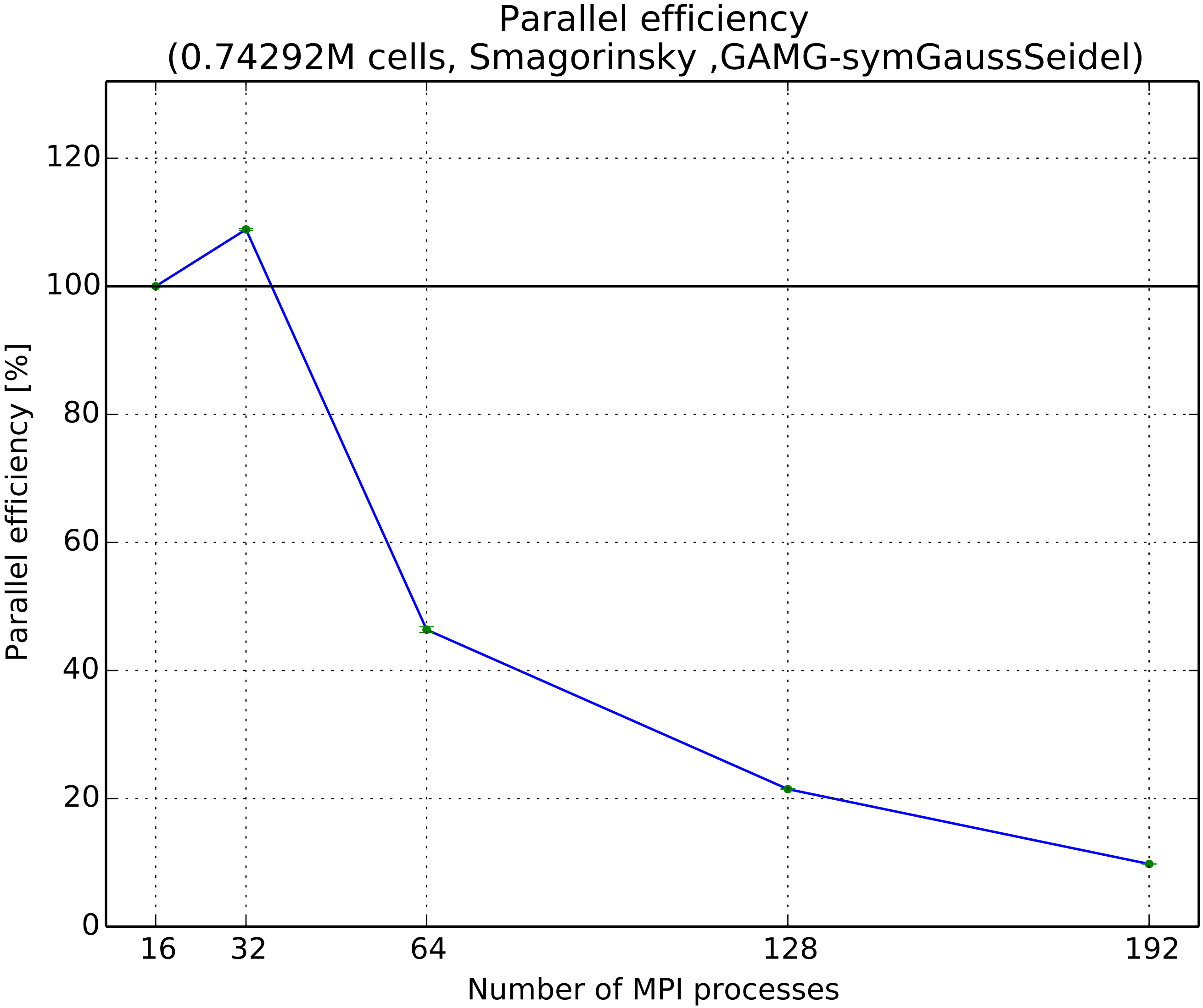
128
192
Number of MPI processes


Parallel efficiency
(0.74292M cells, Smagorinsky ,GAMG-symGaussSeidel)
Parallel efficiency [%]
0
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120
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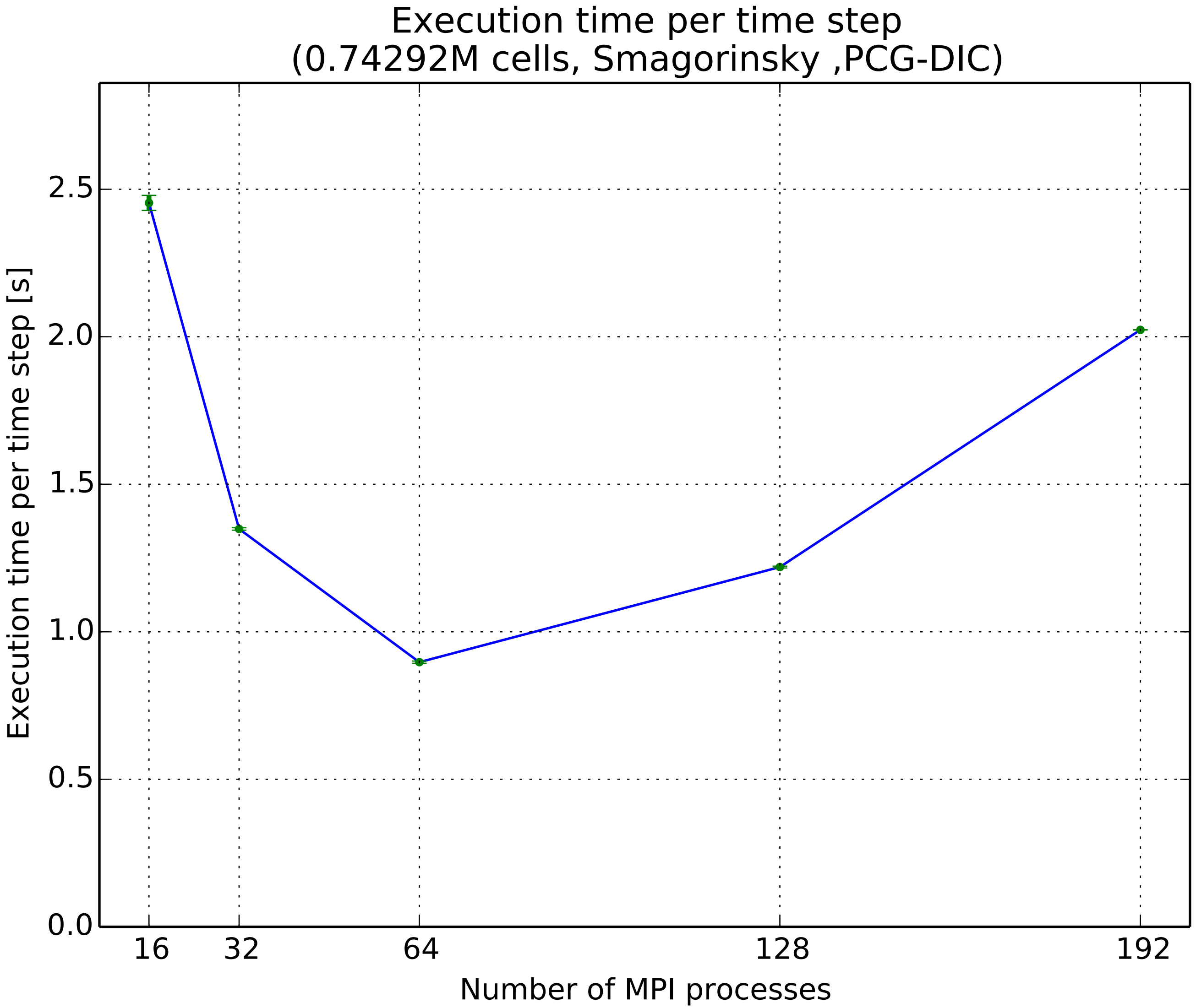
128
192
Number of MPI processes


Execution time per time step
(0.74292M cells, Smagorinsky ,PCG-DIC)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
16
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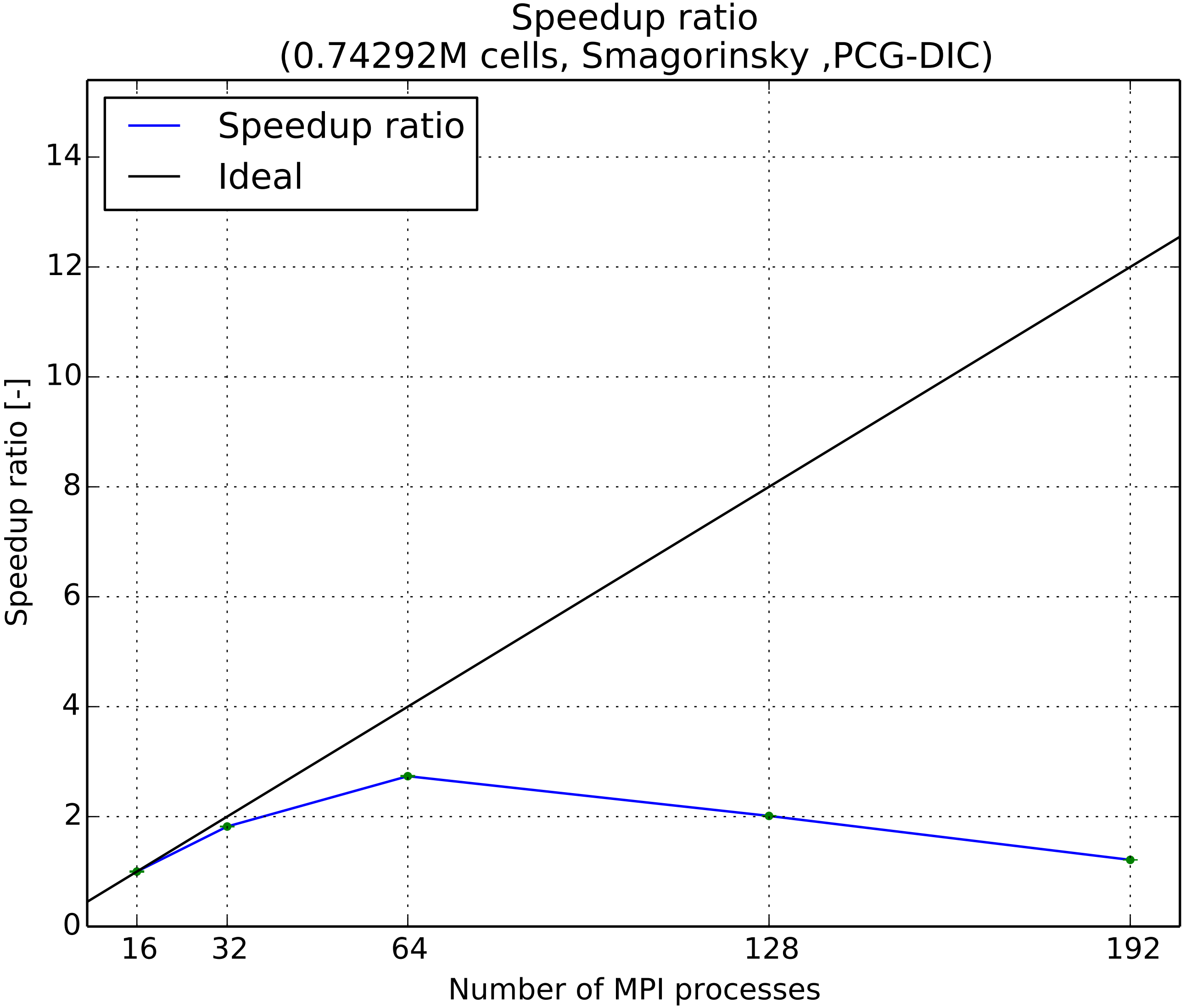
64
128
192
Number of MPI processes


Speedup ratio
(0.74292M cells, Smagorinsky ,PCG-DIC)
Speedup ratio
Ideal
Speedup ratio [-]
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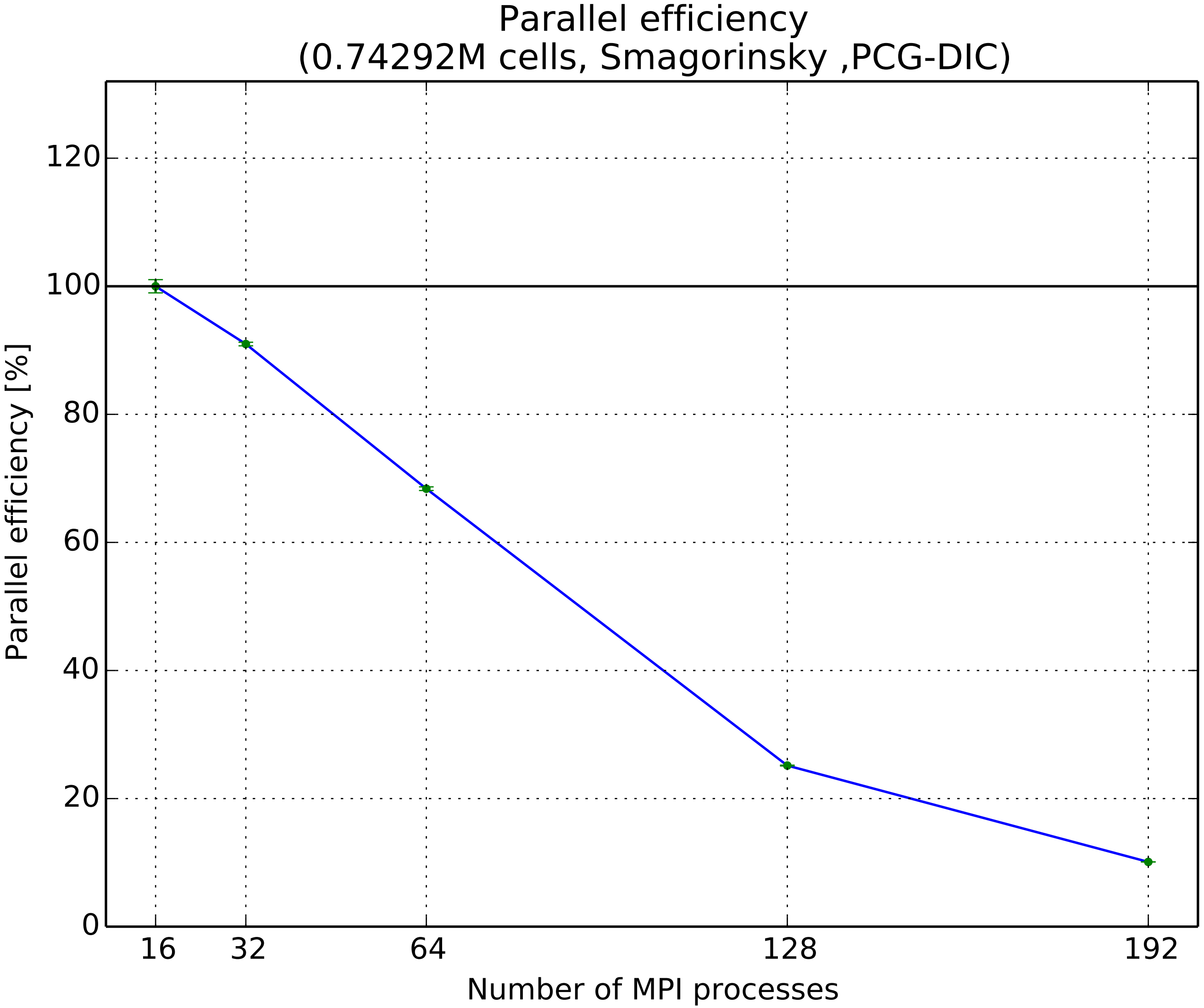
128
192
Number of MPI processes


Parallel efficiency
(0.74292M cells, Smagorinsky ,PCG-DIC)
Parallel efficiency [%]
0
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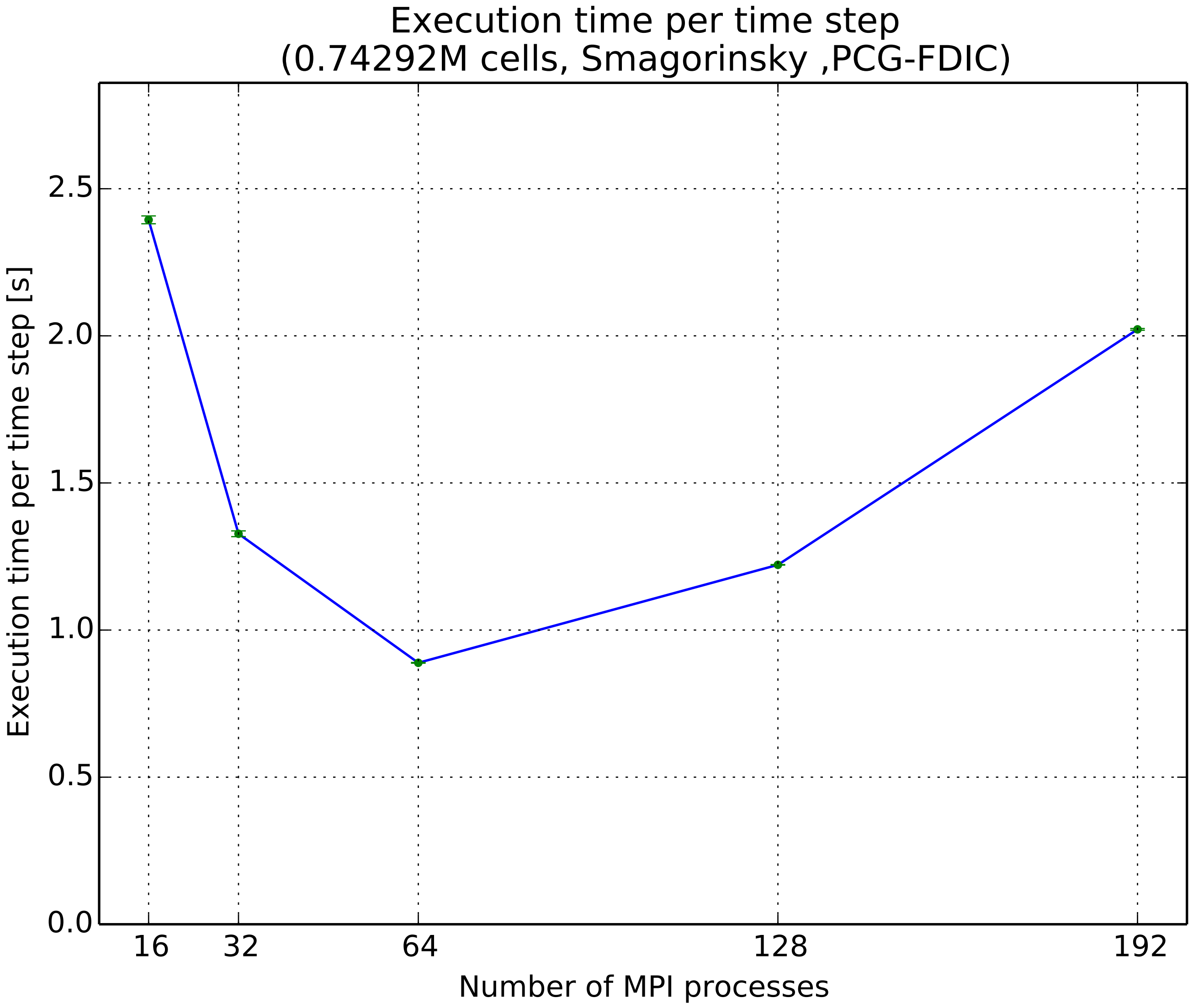
128
192
Number of MPI processes


Execution time per time step
(0.74292M cells, Smagorinsky ,PCG-FDIC)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
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128
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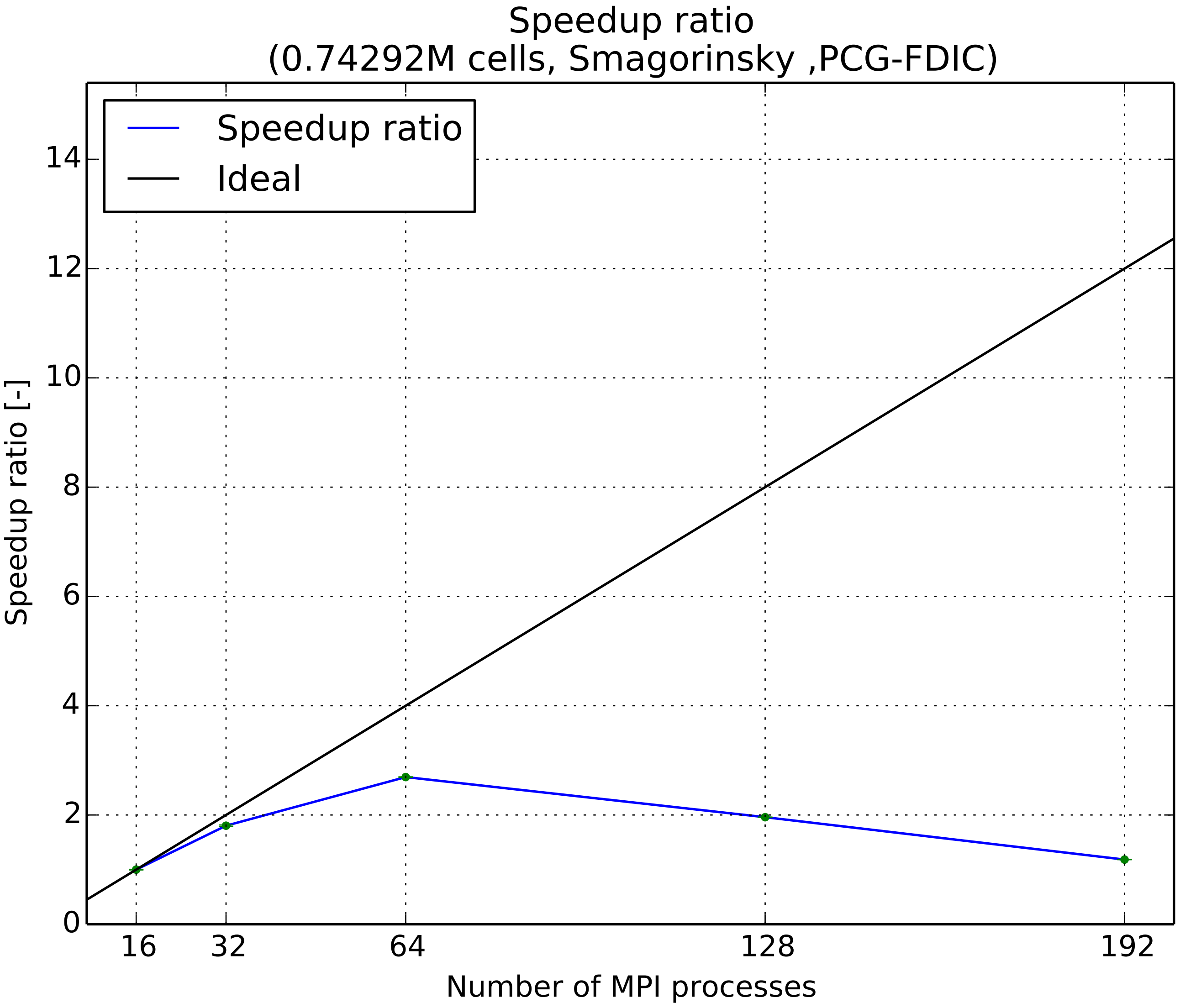
Number of MPI processes


Speedup ratio
(0.74292M cells, Smagorinsky ,PCG-FDIC)
Speedup ratio
Ideal
Speedup ratio [-]
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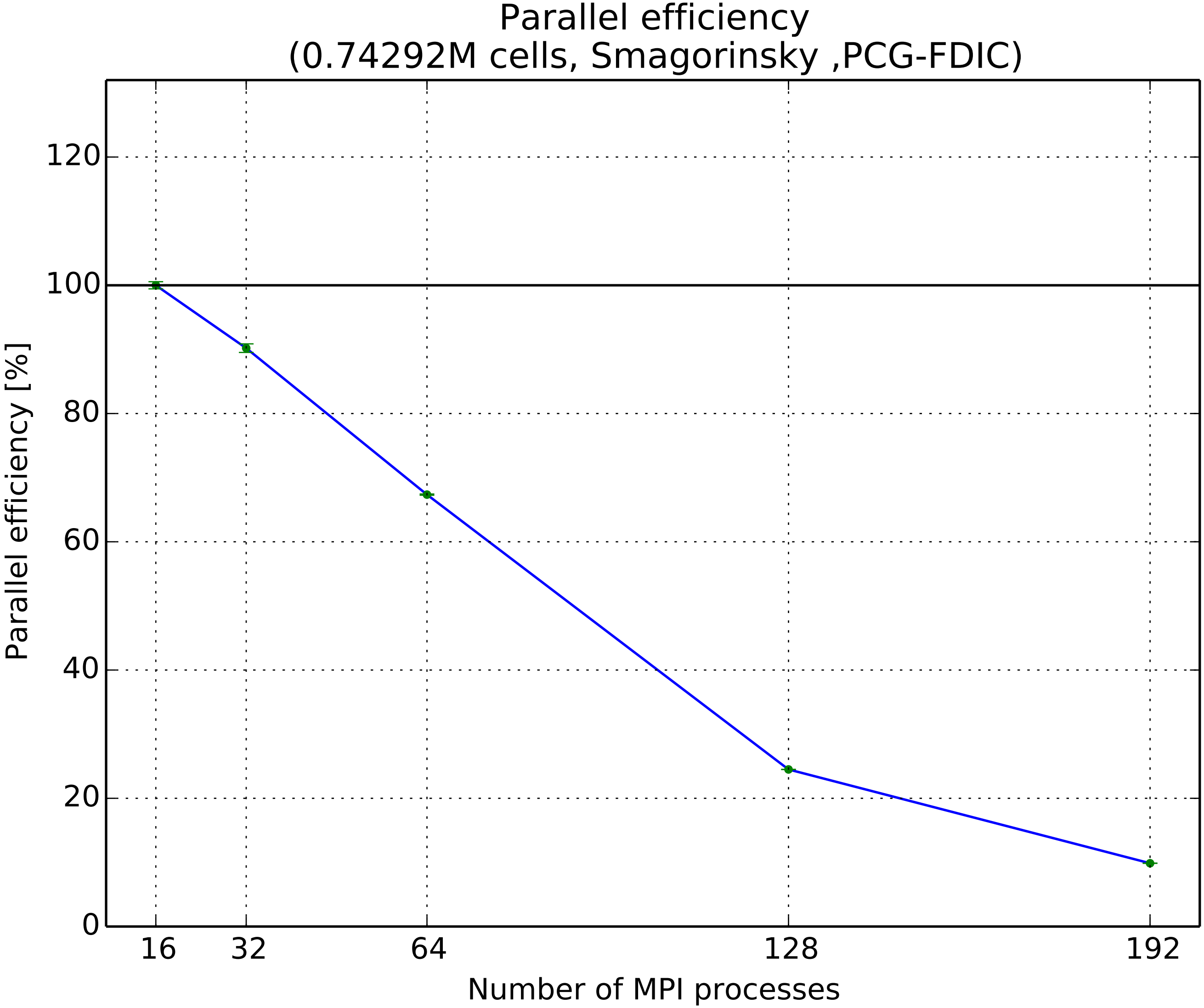
Number of MPI processes


Parallel efficiency
(0.74292M cells, Smagorinsky ,PCG-FDIC)
Parallel efficiency [%]
0
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60
80
100
120
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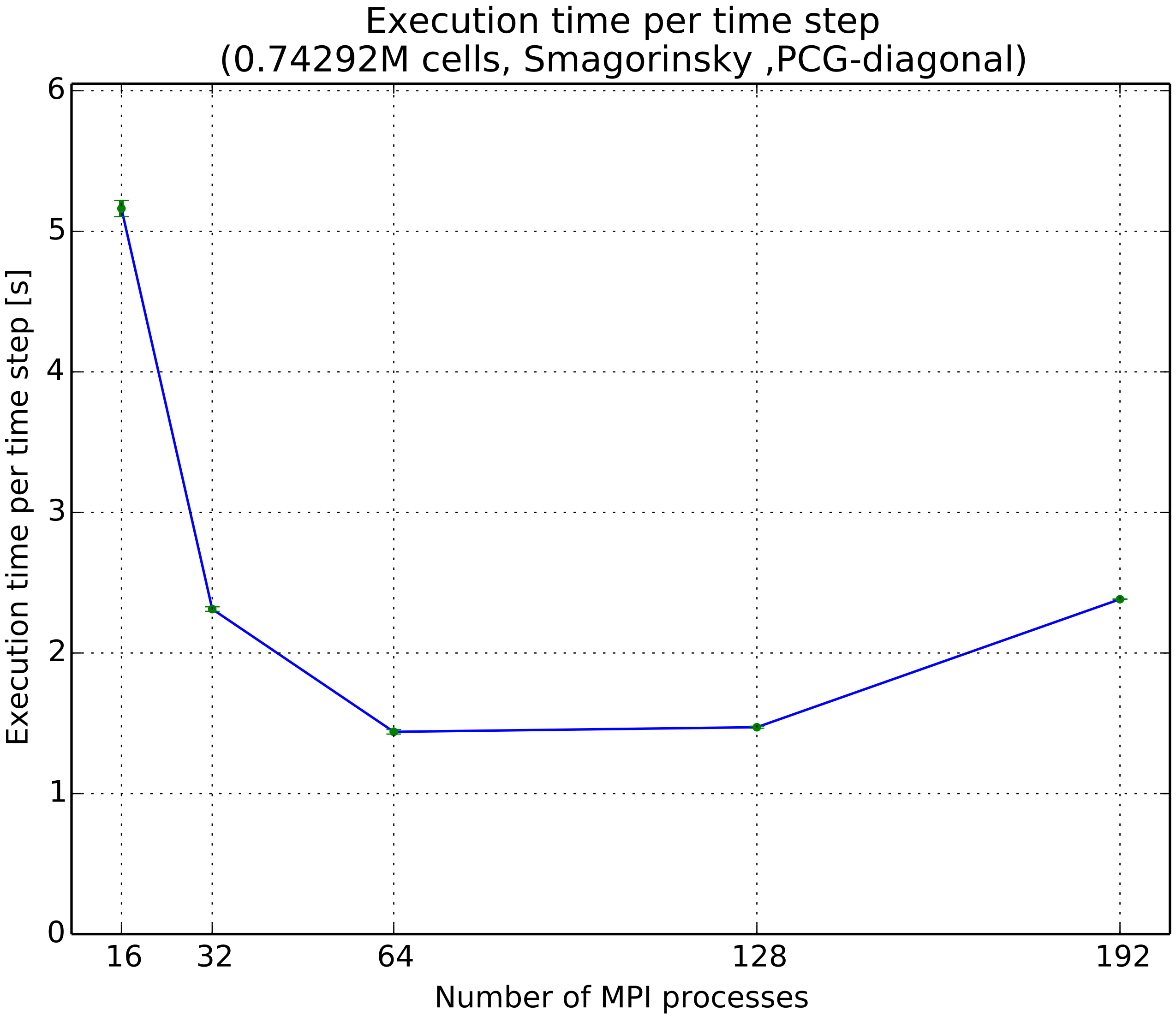
32
64
128
192
Number of MPI processes


Execution time per time step
(0.74292M cells, Smagorinsky ,PCG-diagonal)
Execution time per time step [s]
Number of MPI processes
0
1
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4
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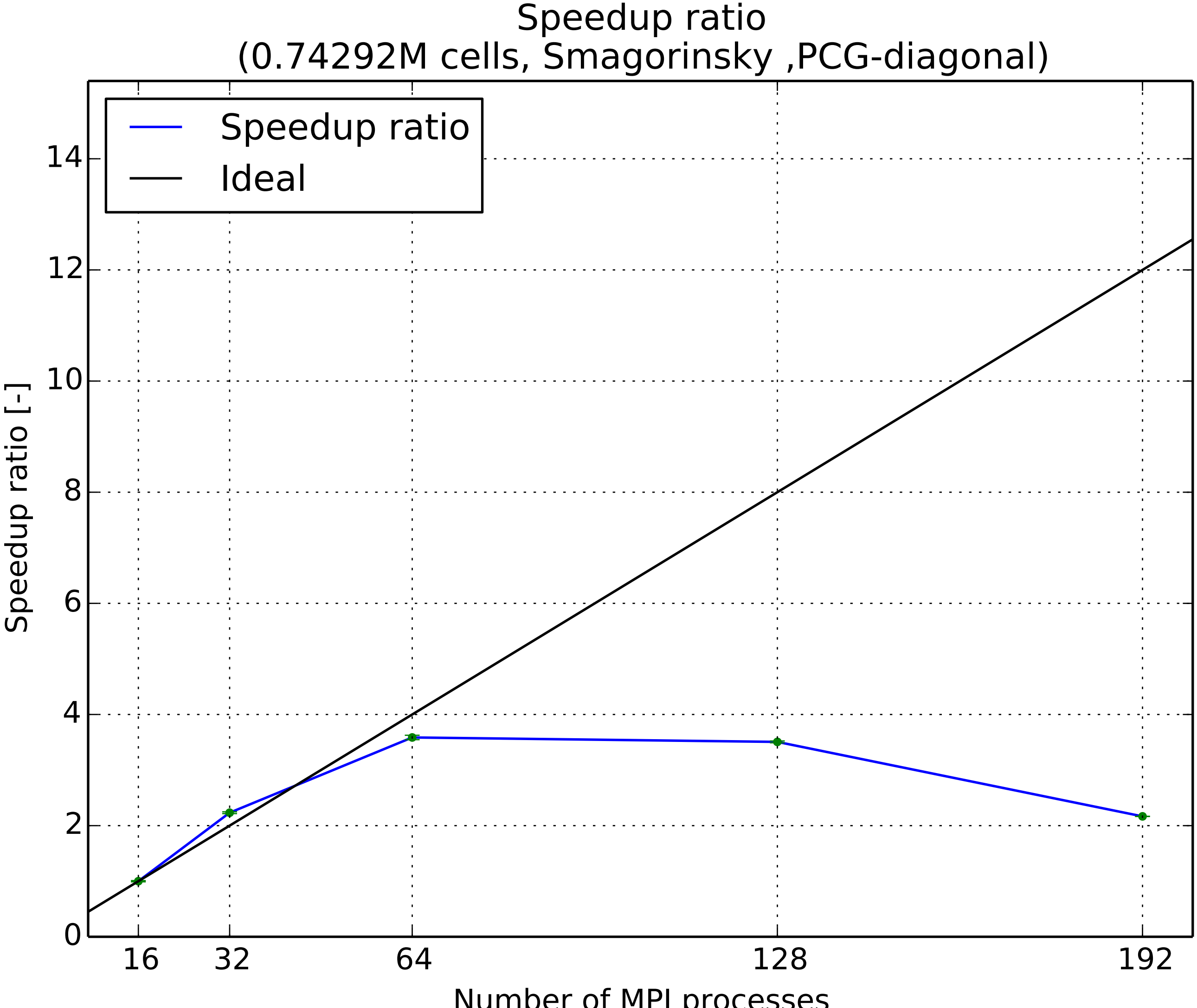
Speedup ratio
(0.74292M cells, Smagorinsky ,PCG-diagonal)
Speedup ratio
Ideal
Speedup ratio [-]
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128
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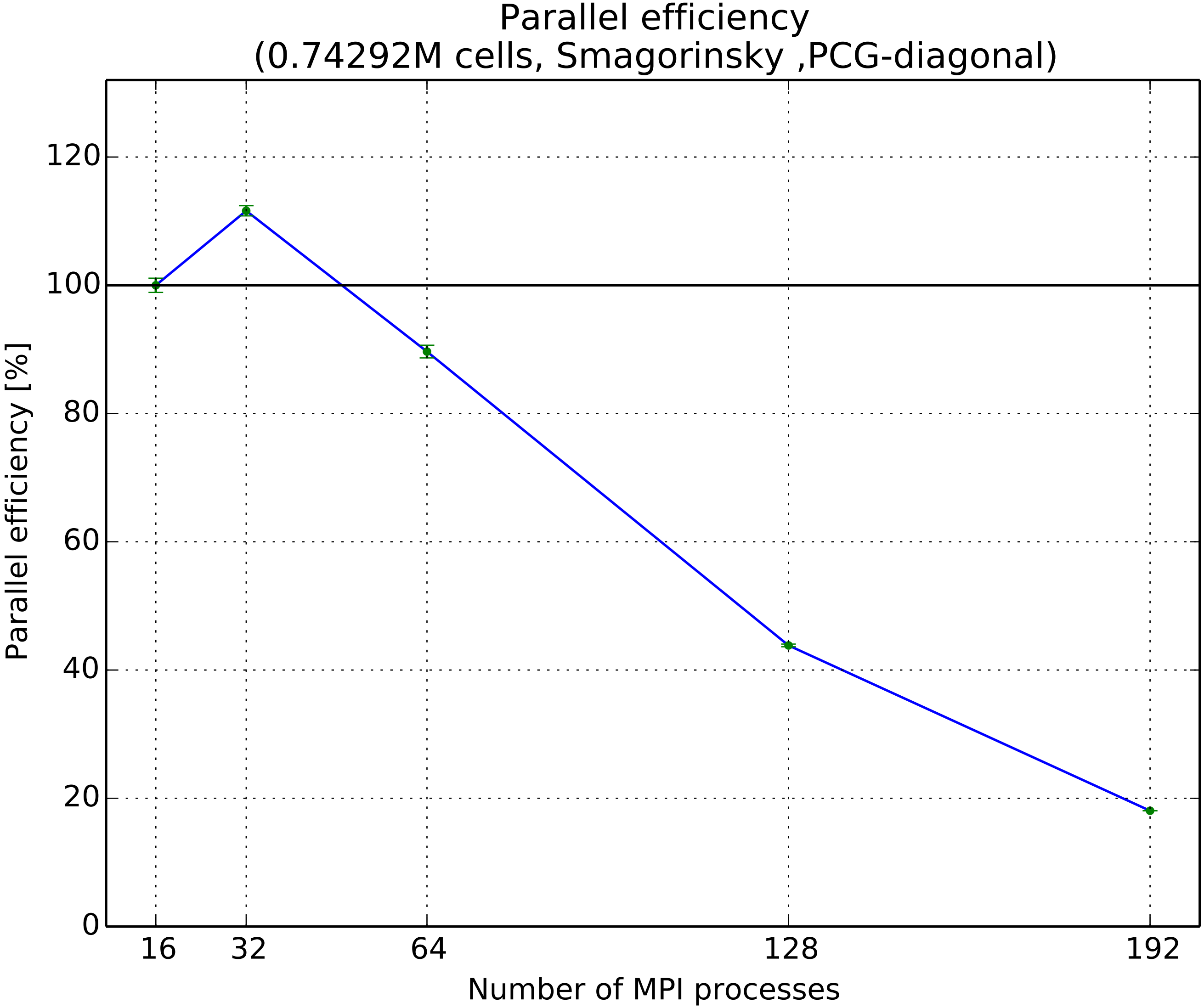
Number of MPI processes


Parallel efficiency
(0.74292M cells, Smagorinsky ,PCG-diagonal)
Parallel efficiency [%]
0
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120
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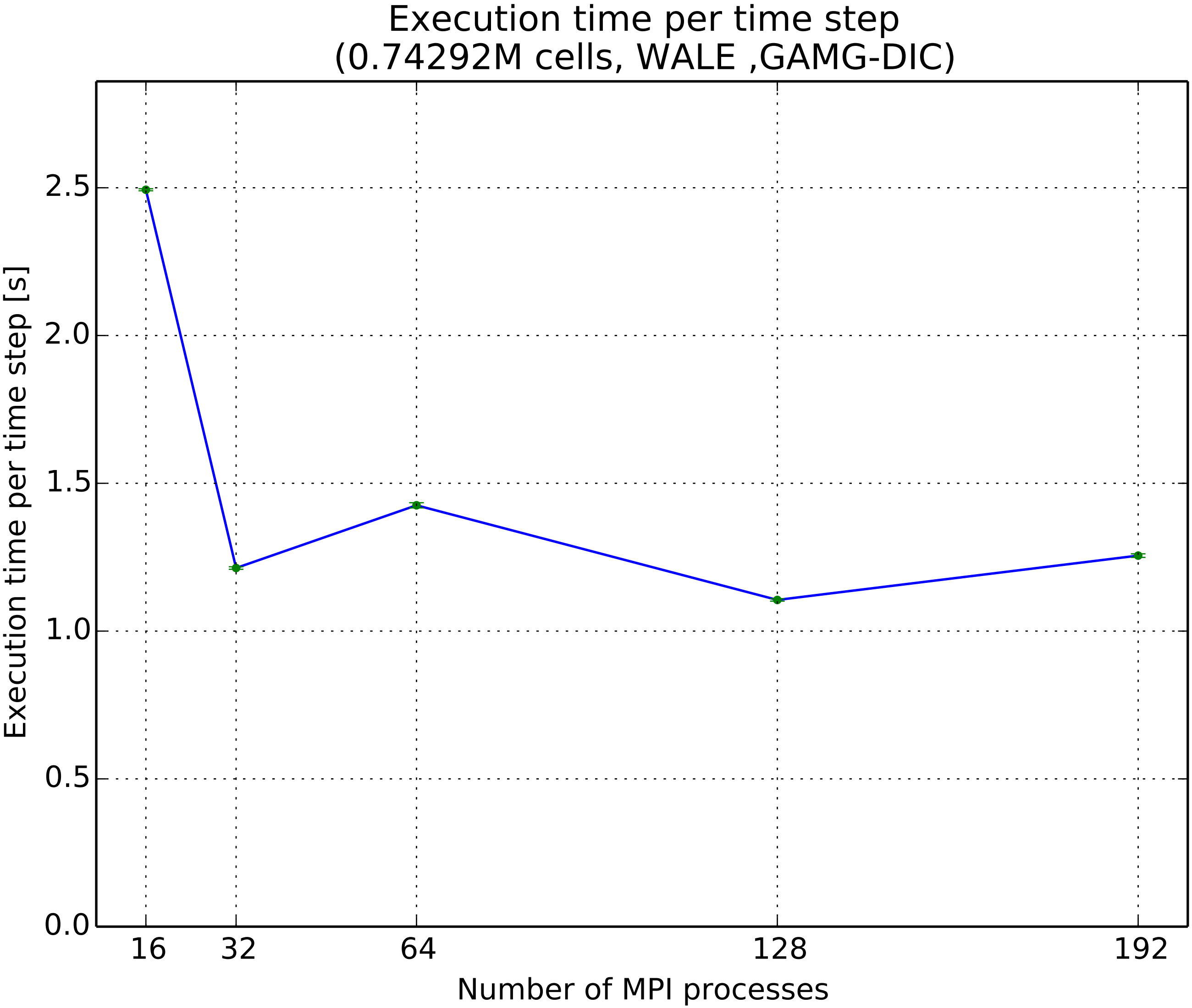
128
192
Number of MPI processes


Execution time per time step
(0.74292M cells, WALE ,GAMG-DIC)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
16
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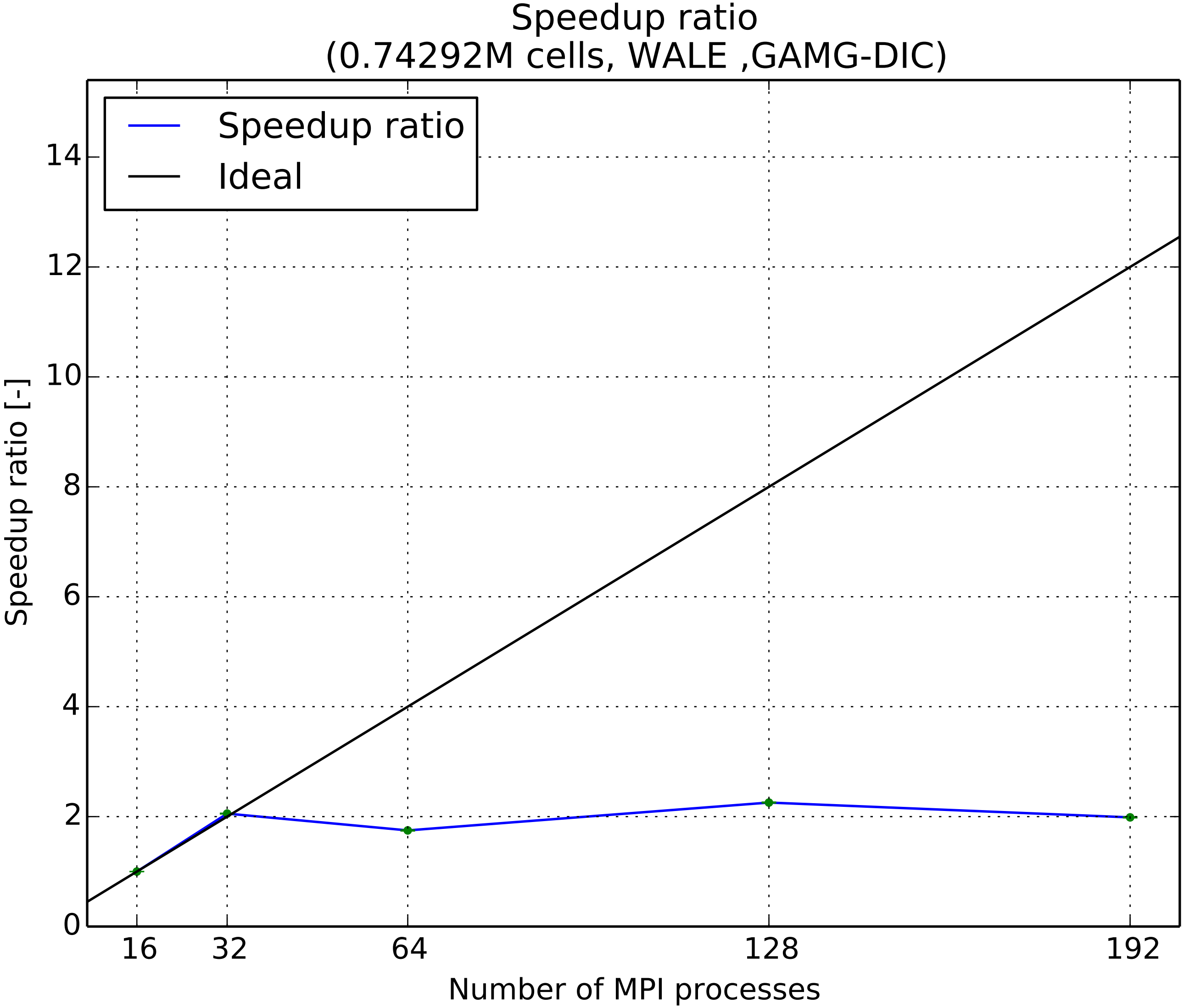
128
192
Number of MPI processes


Speedup ratio
(0.74292M cells, WALE ,GAMG-DIC)
Speedup ratio
Ideal
Speedup ratio [-]
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128
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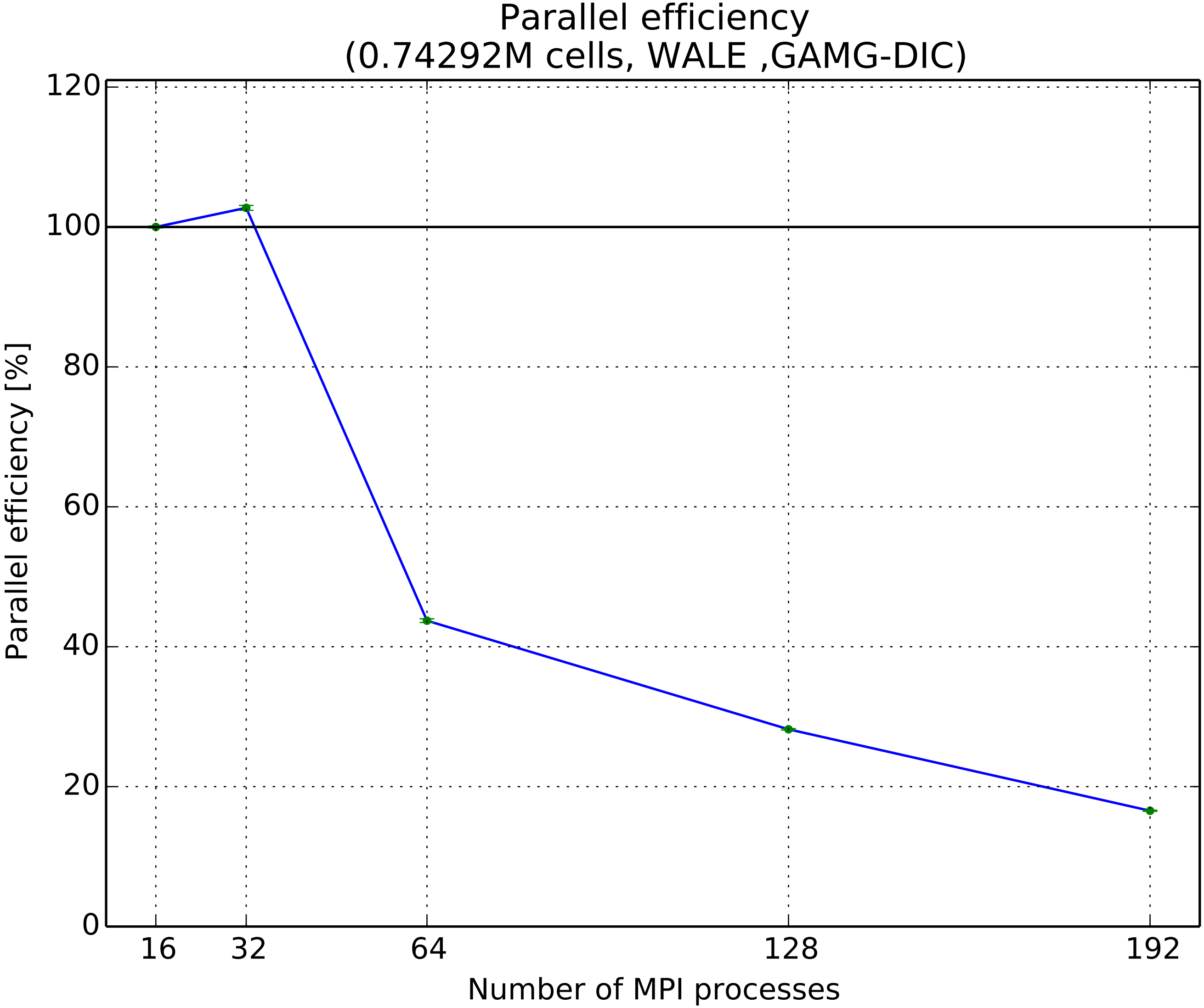
Number of MPI processes


Parallel efficiency
(0.74292M cells, WALE ,GAMG-DIC)
Parallel efficiency [%]
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80
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120
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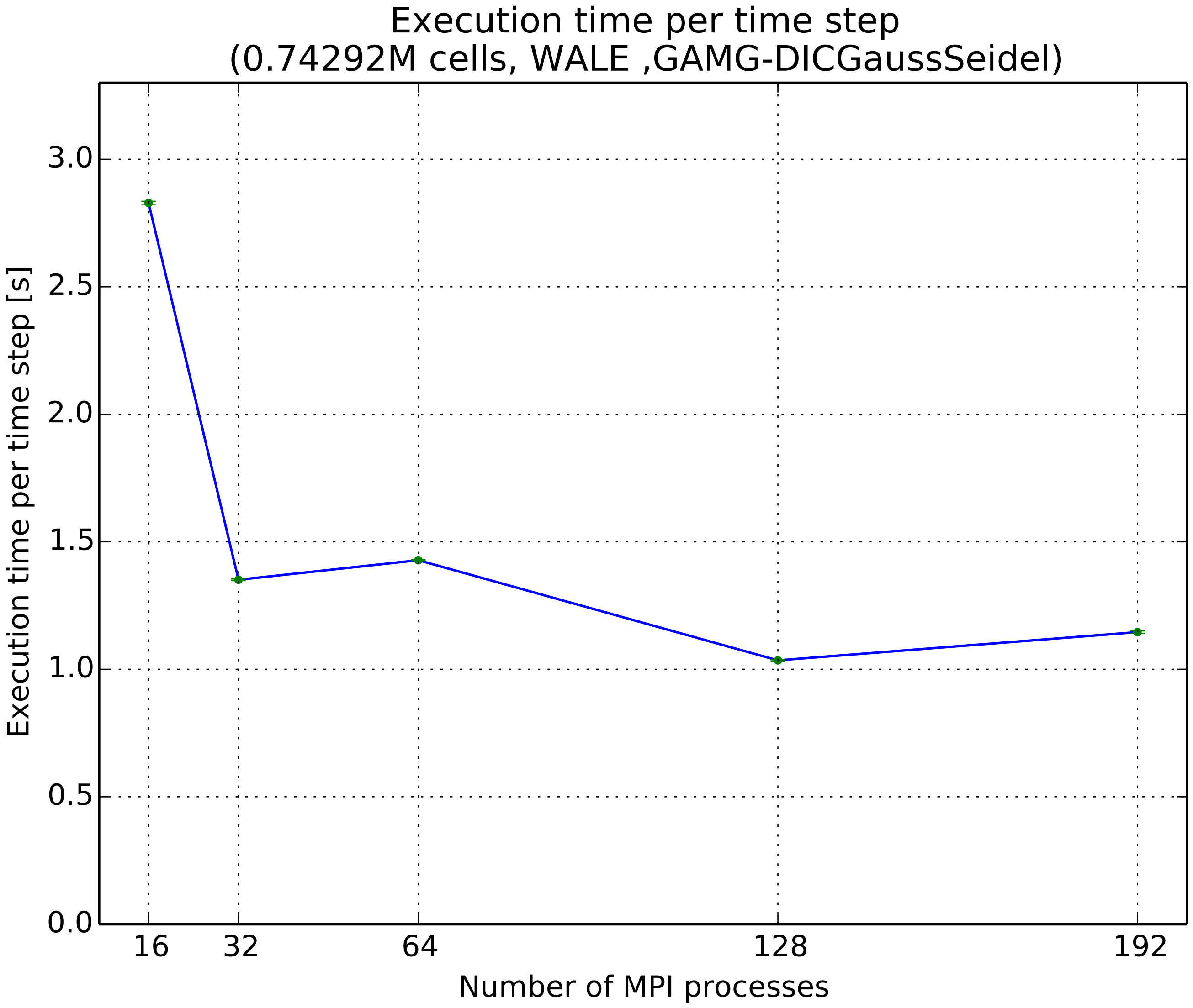
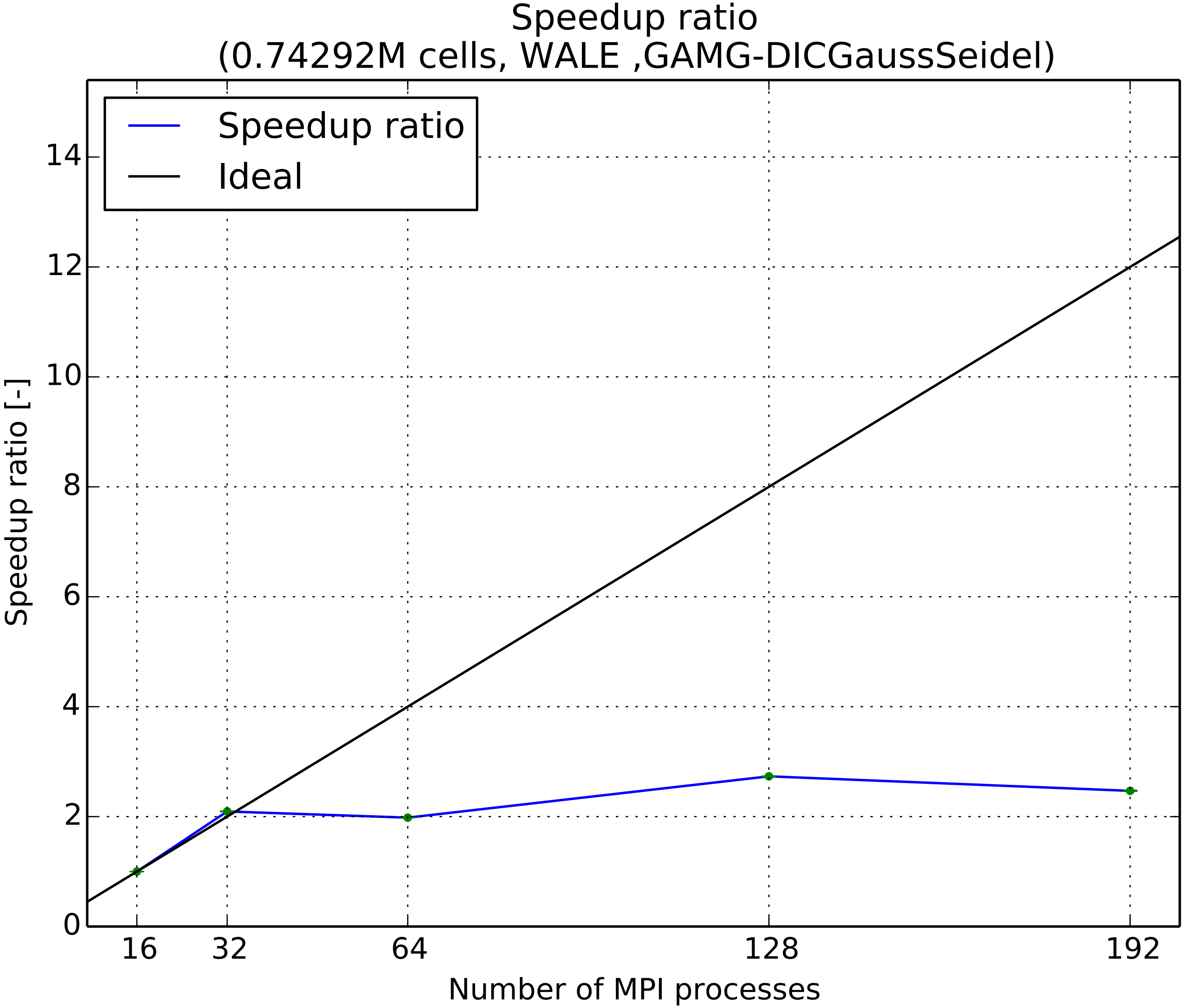
128
192
Number of MPI processes


Execution time per time step
(0.74292M cells, WALE ,GAMG-DICGaussSeidel)
Execution time per time step [s]
3.0
2.5
2.0
1.5
1.0
0.5
0.0
16
32
64
128
192
Number of MPI processes


Speedup ratio
(0.74292M cells, WALE ,GAMG-DICGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
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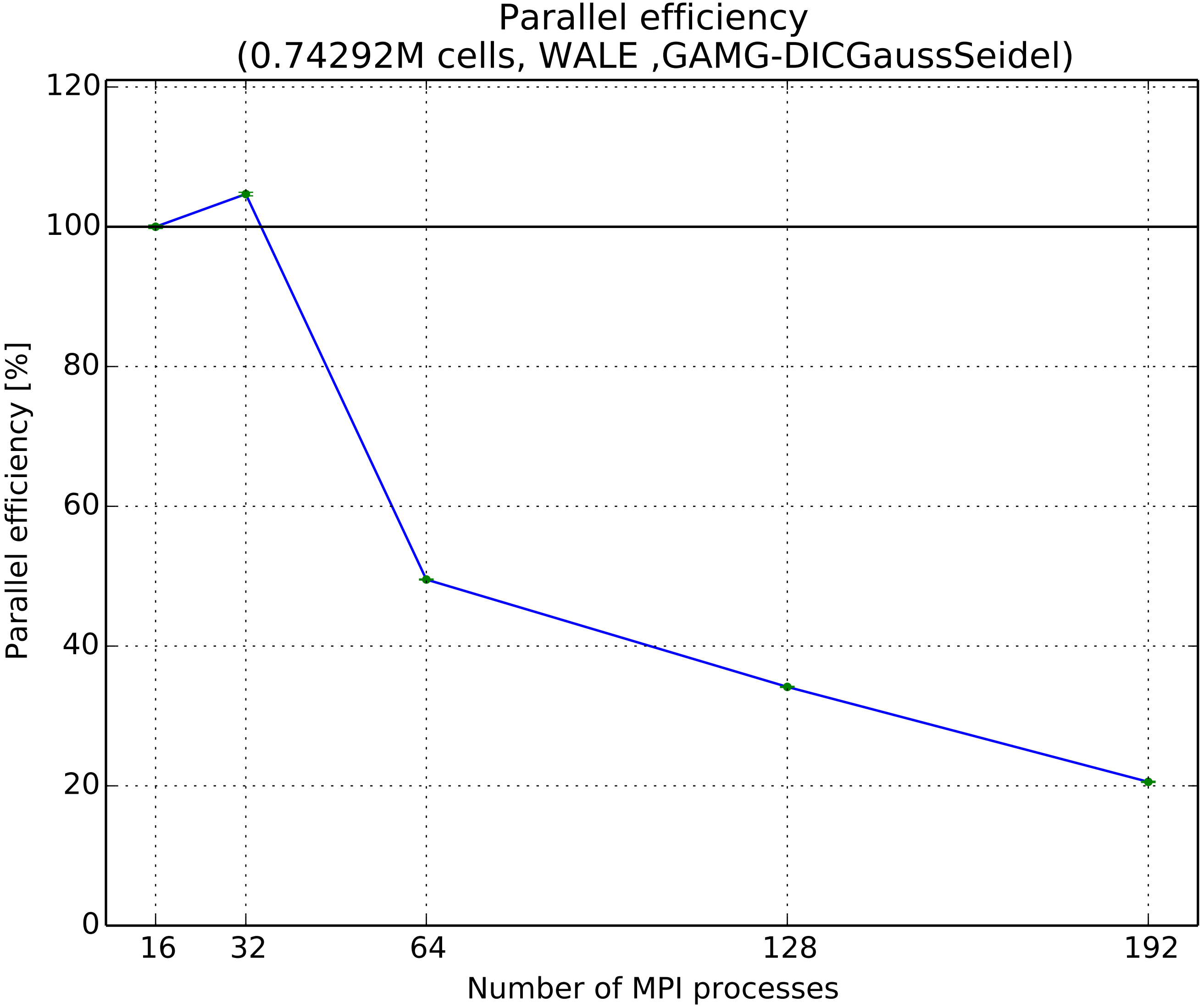
128
192
Number of MPI processes


Parallel efficiency
(0.74292M cells, WALE ,GAMG-DICGaussSeidel)
Parallel efficiency [%]
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128
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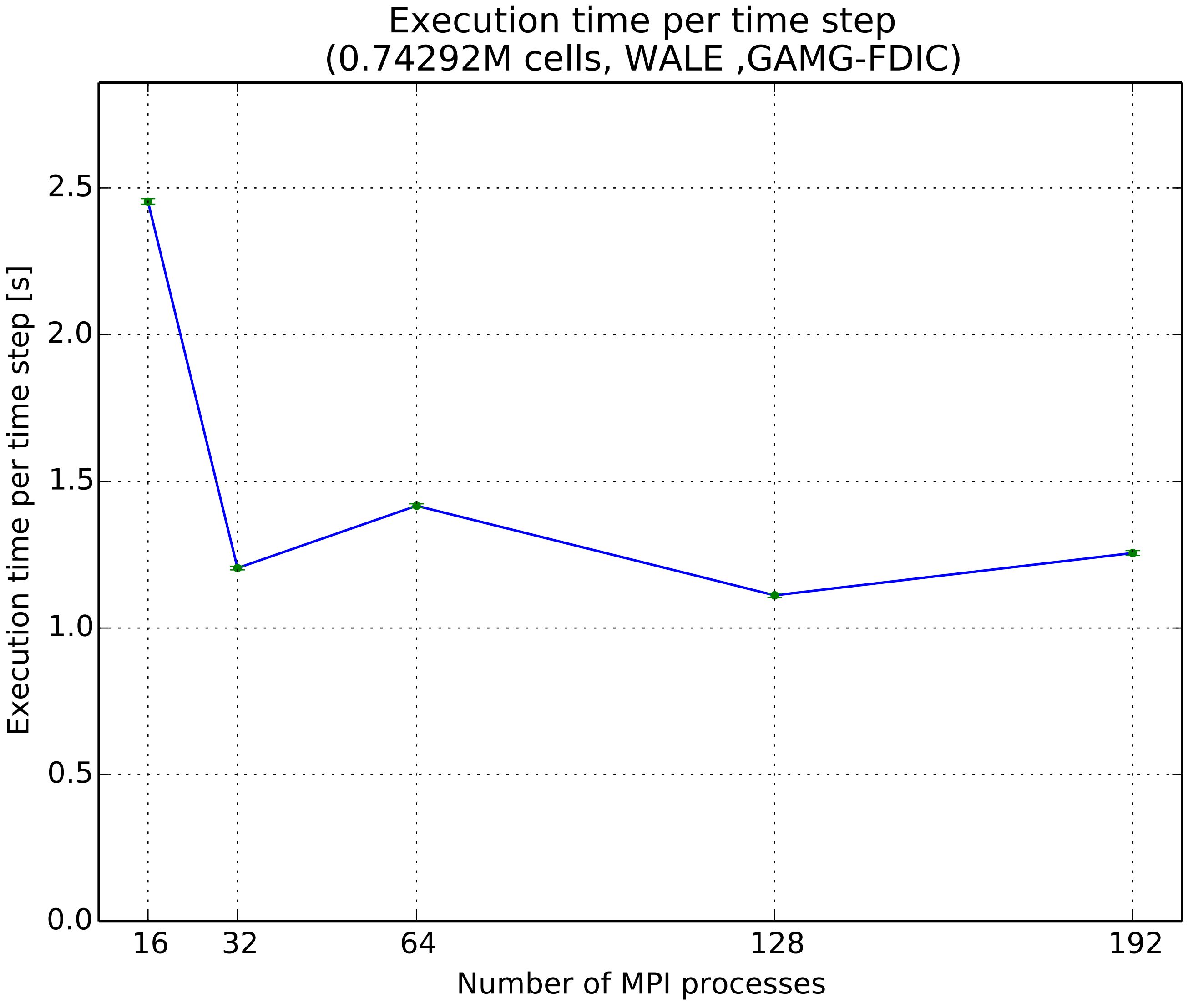
Number of MPI processes


Execution time per time step
(0.74292M cells, WALE ,GAMG-FDIC)
Execution time per time step [s]
0.0
0.5
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1.5
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2.5
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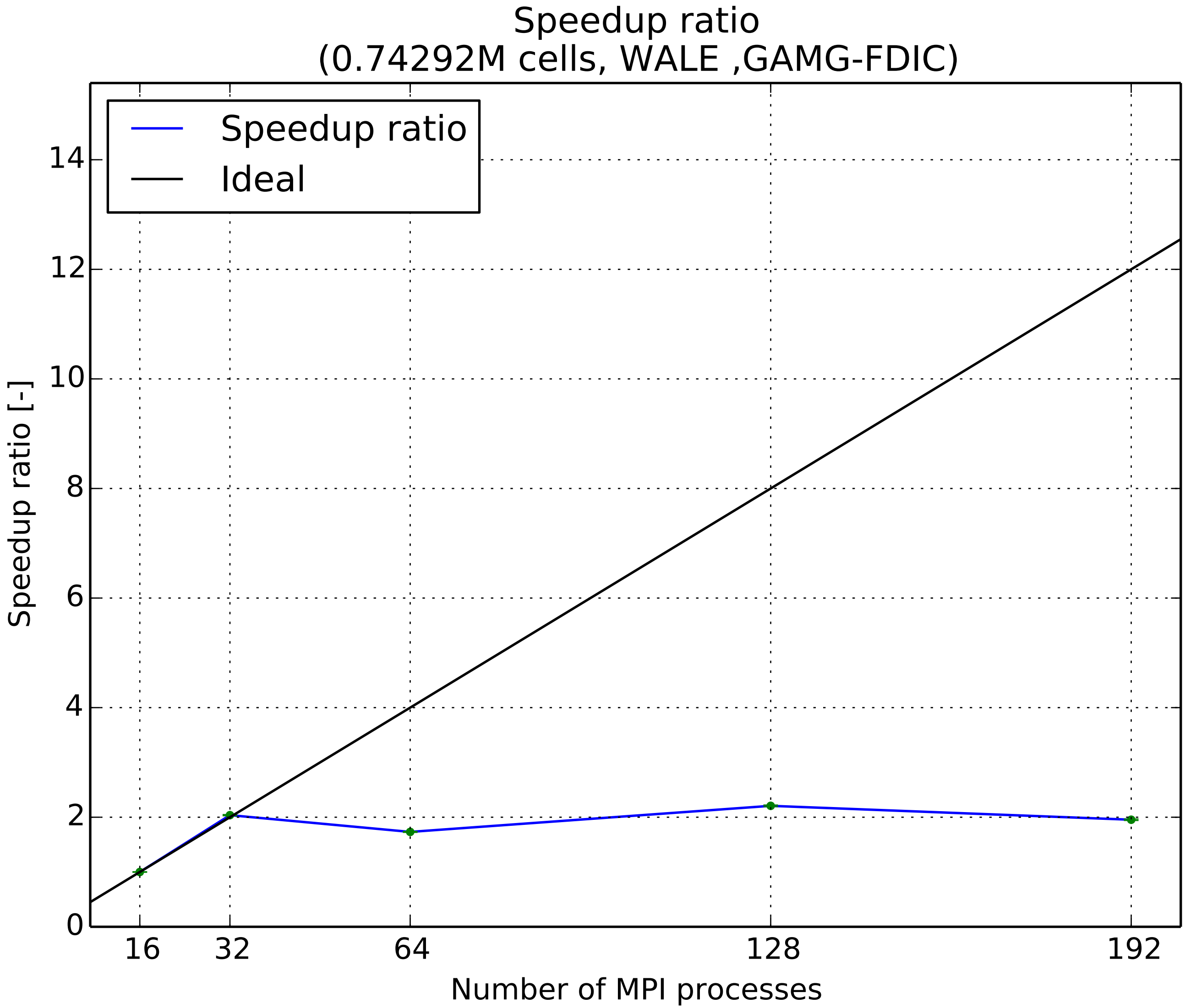
Number of MPI processes


Speedup ratio
(0.74292M cells, WALE ,GAMG-FDIC)
Speedup ratio
Ideal
Speedup ratio [-]
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128
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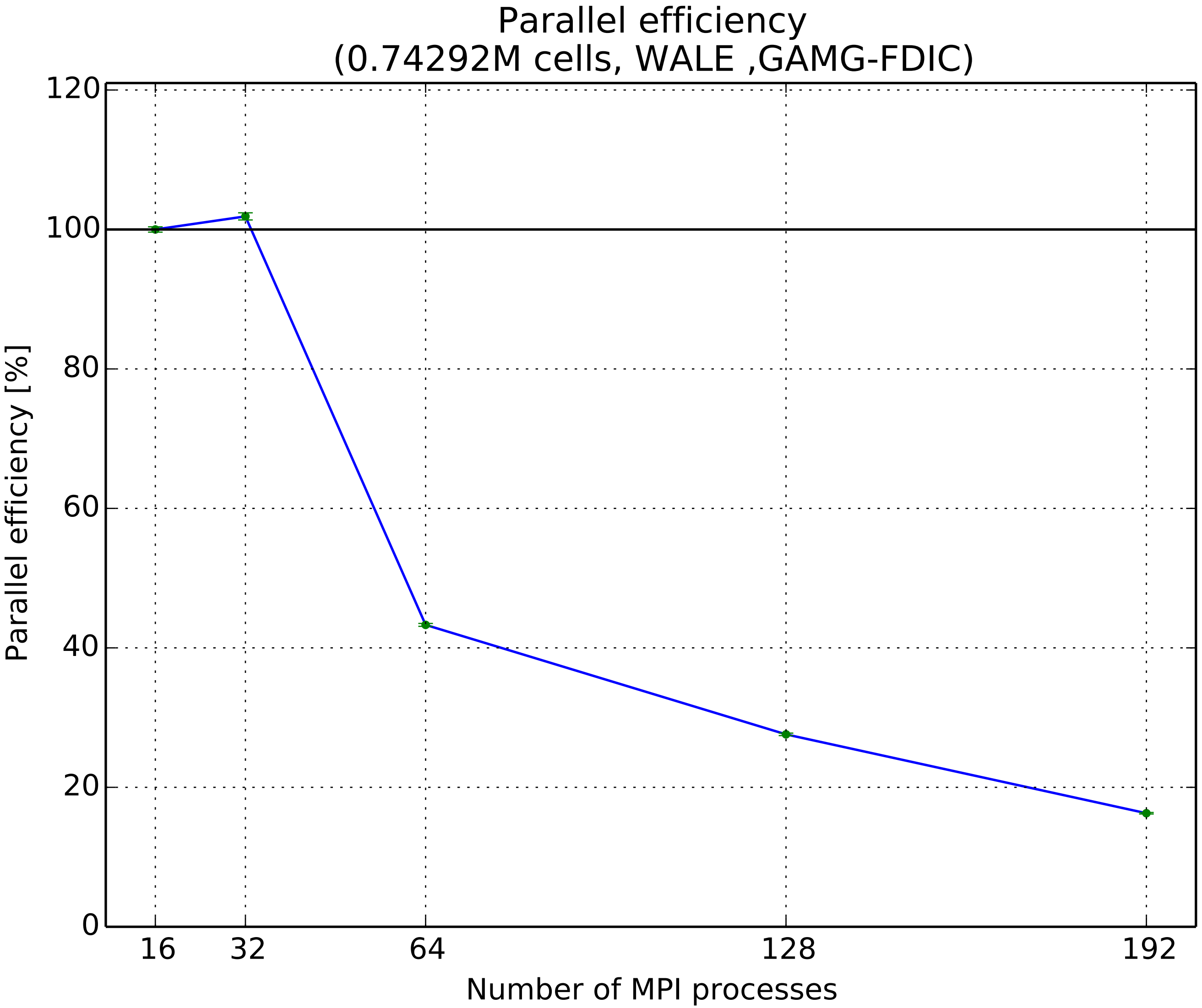
Number of MPI processes


Parallel efficiency
(0.74292M cells, WALE ,GAMG-FDIC)
Parallel efficiency [%]
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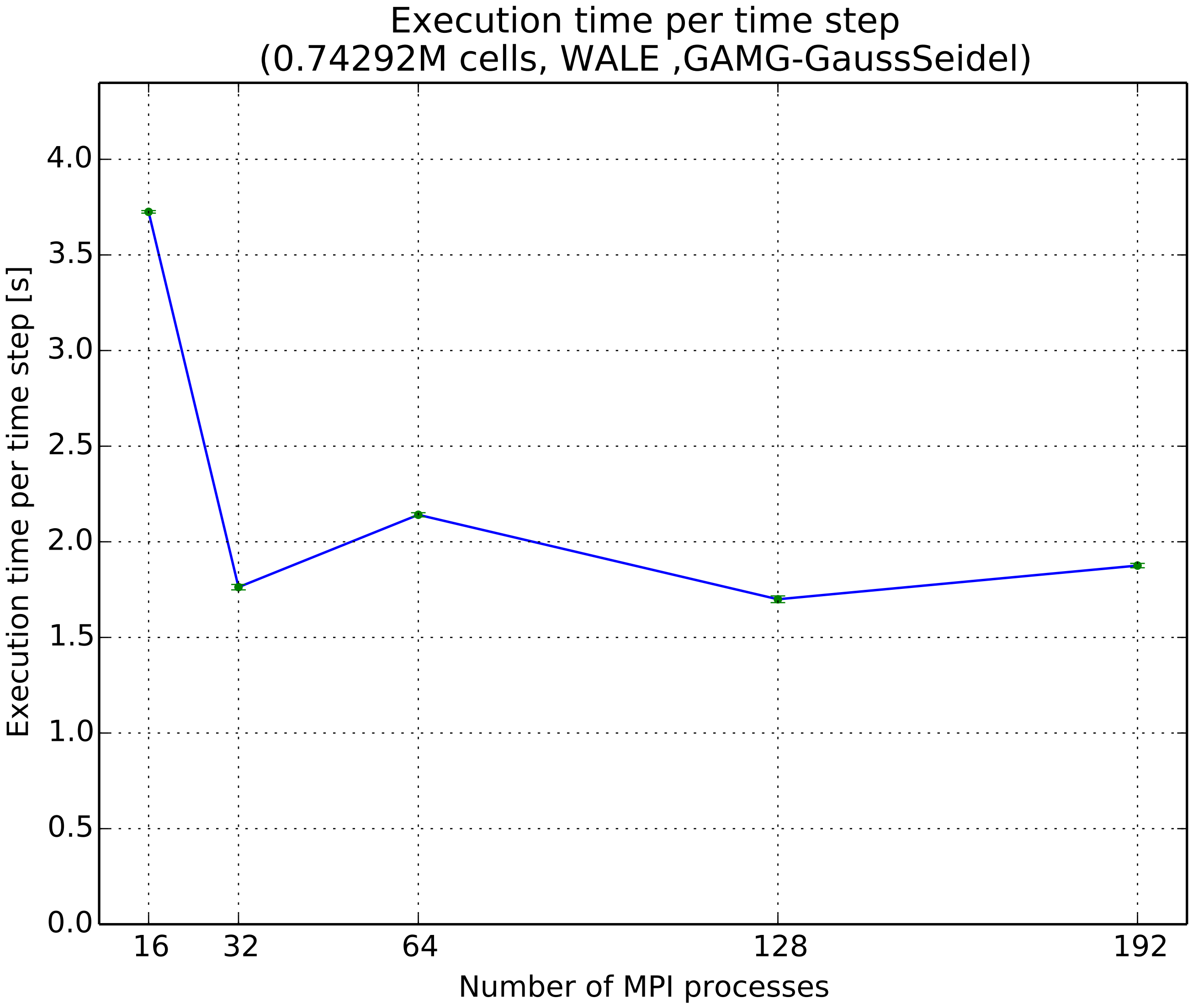
Number of MPI processes


Execution time per time step
(0.74292M cells, WALE ,GAMG-GaussSeidel)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
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3.5
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16
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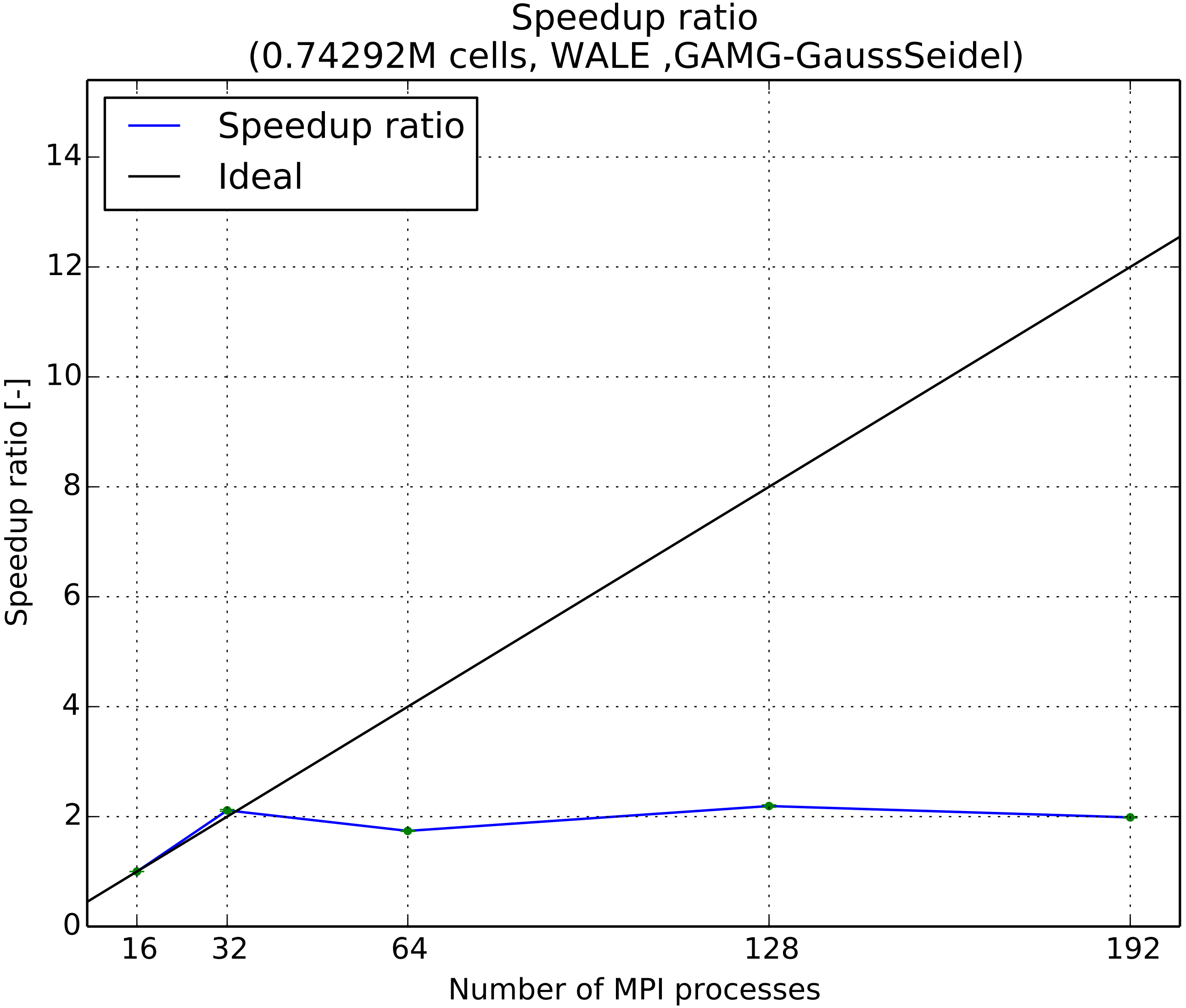
Number of MPI processes


Speedup ratio
(0.74292M cells, WALE ,GAMG-GaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
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128
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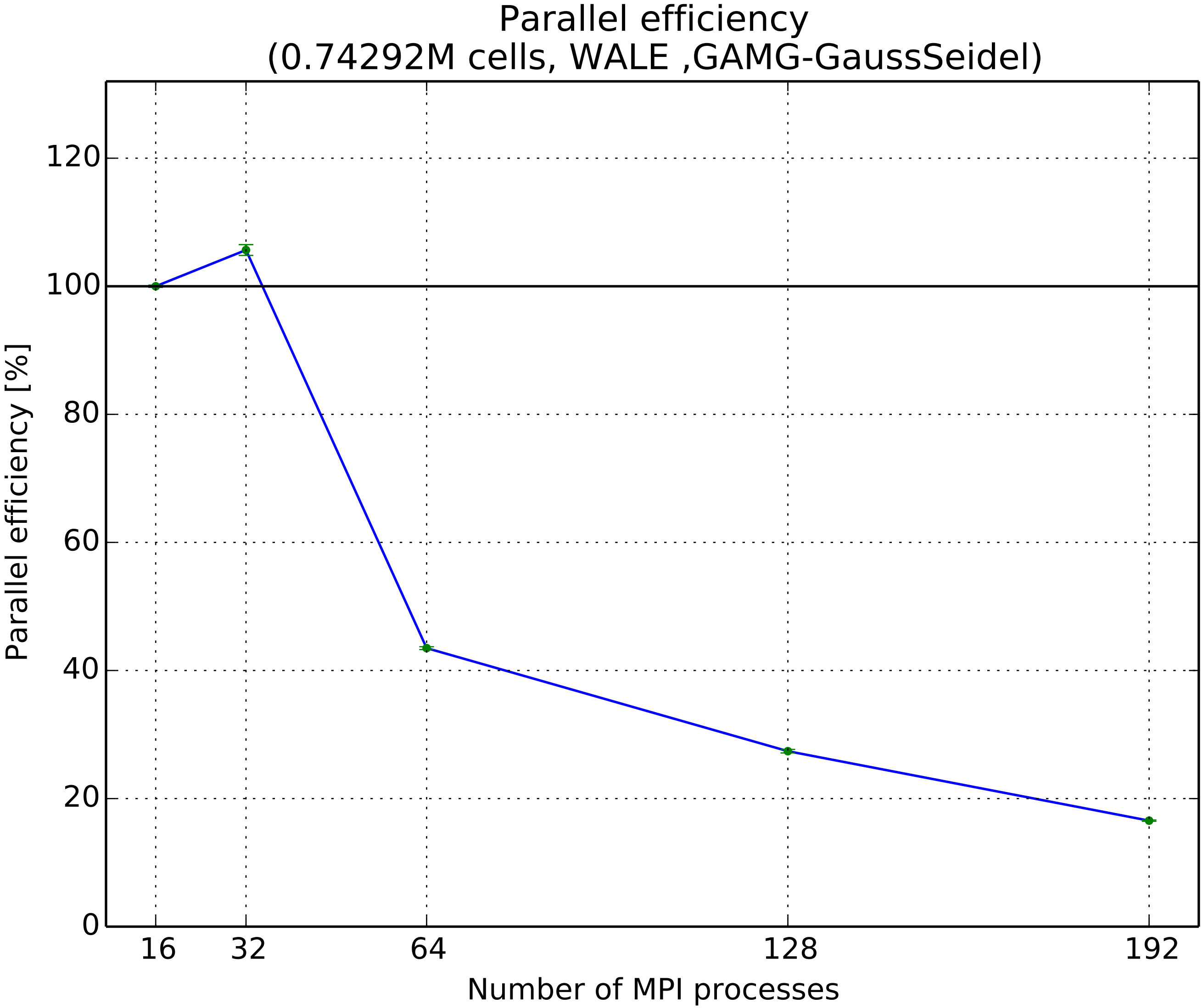
Number of MPI processes


Parallel efficiency
(0.74292M cells, WALE ,GAMG-GaussSeidel)
Parallel efficiency [%]
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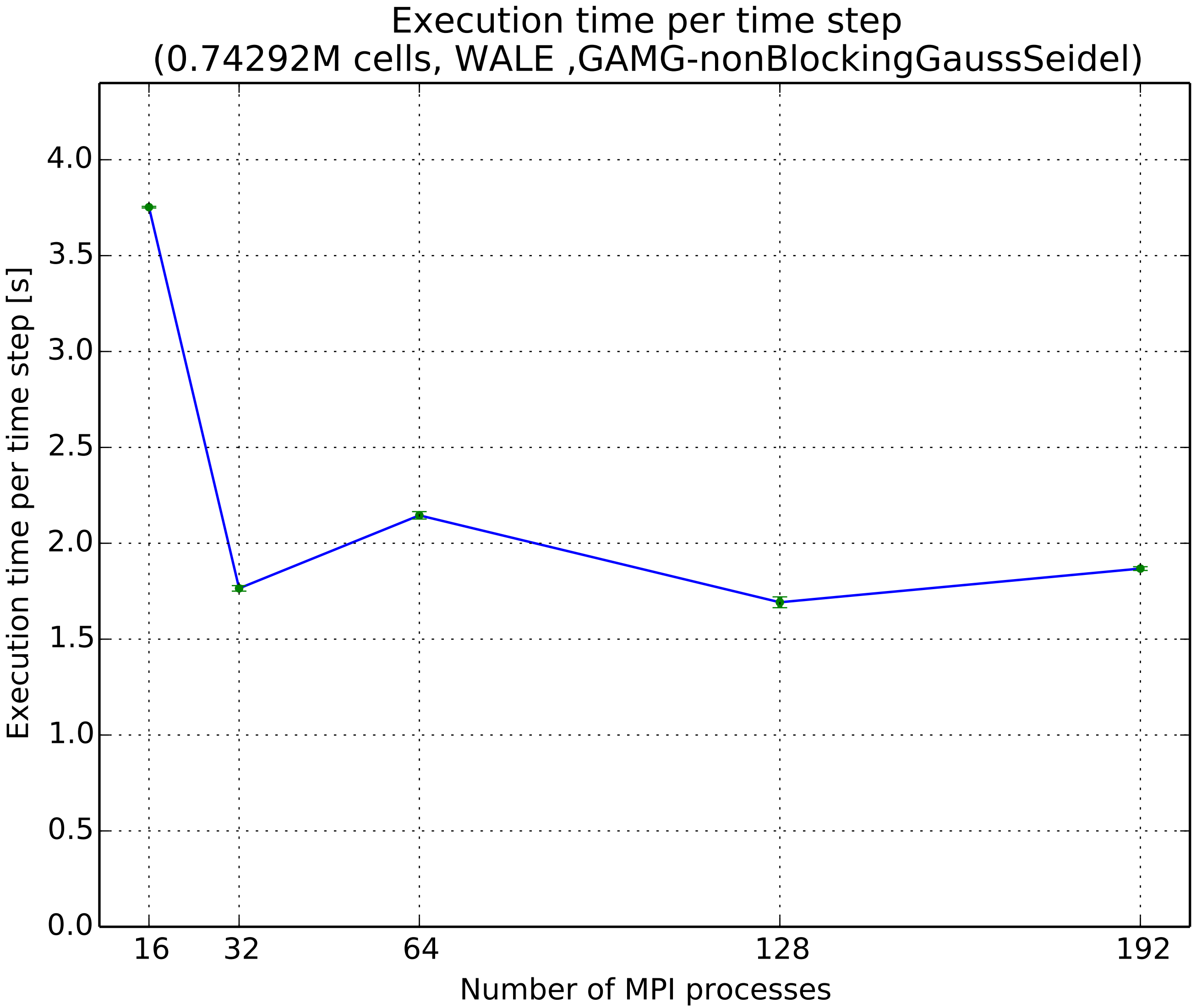
128
192
Number of MPI processes



Execution time per time step
(0.74292M cells, WALE ,GAMG-nonBlockingGaussSeidel)
Execution time per time step [s]
0.0
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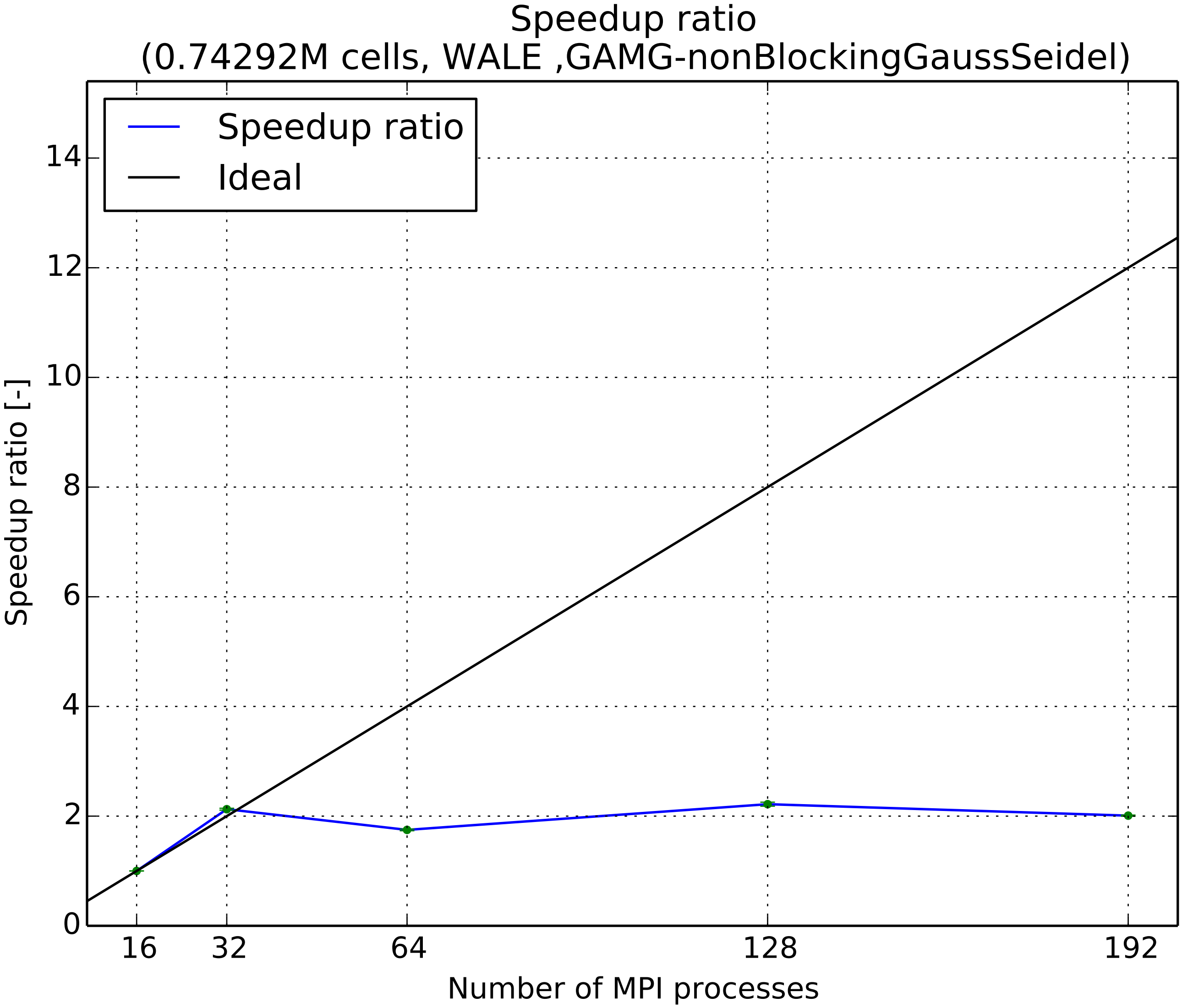
Number of MPI processes


Speedup ratio
(0.74292M cells, WALE ,GAMG-nonBlockingGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
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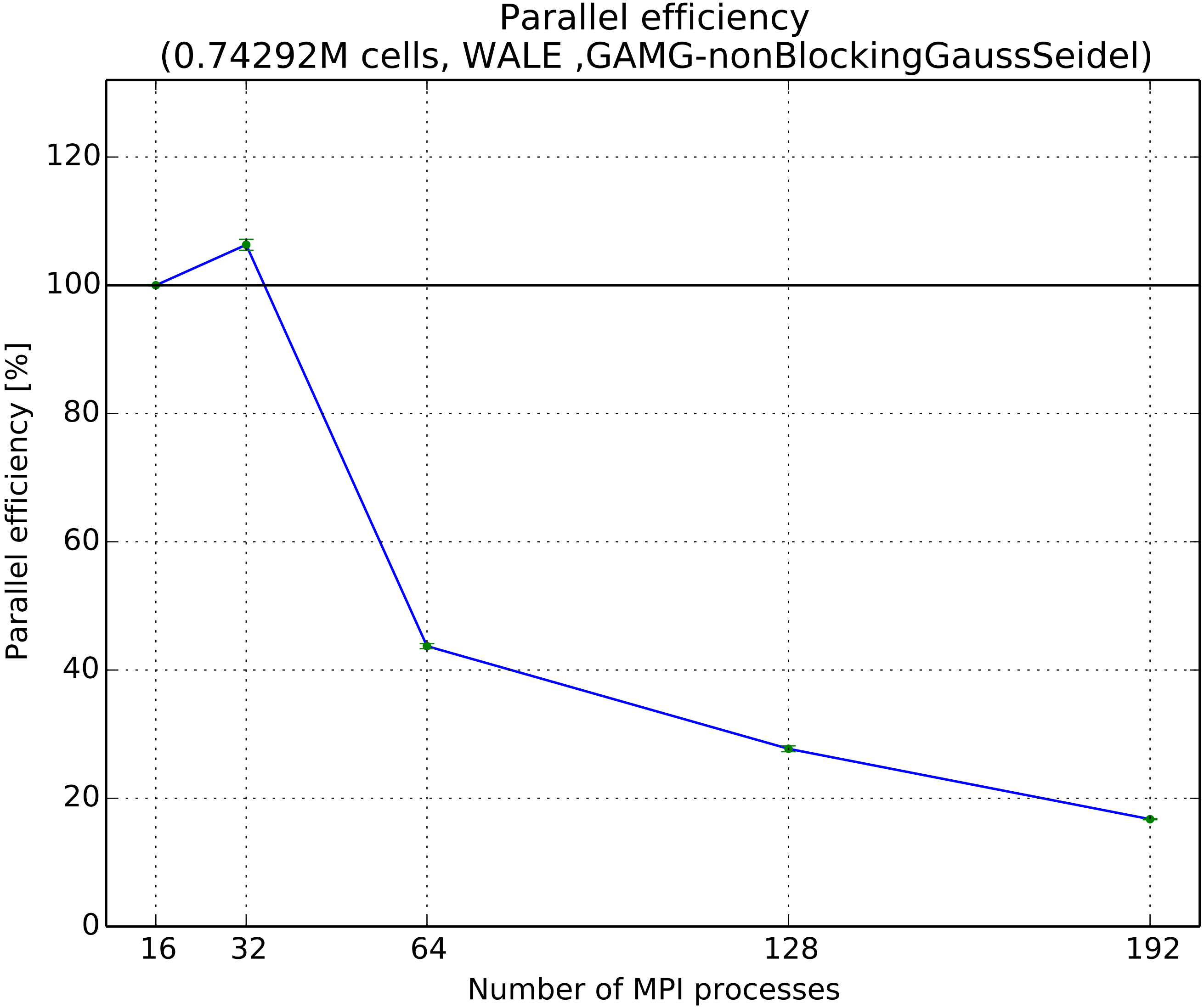
Number of MPI processes


Parallel efficiency
(0.74292M cells, WALE ,GAMG-nonBlockingGaussSeidel)
Parallel efficiency [%]
0
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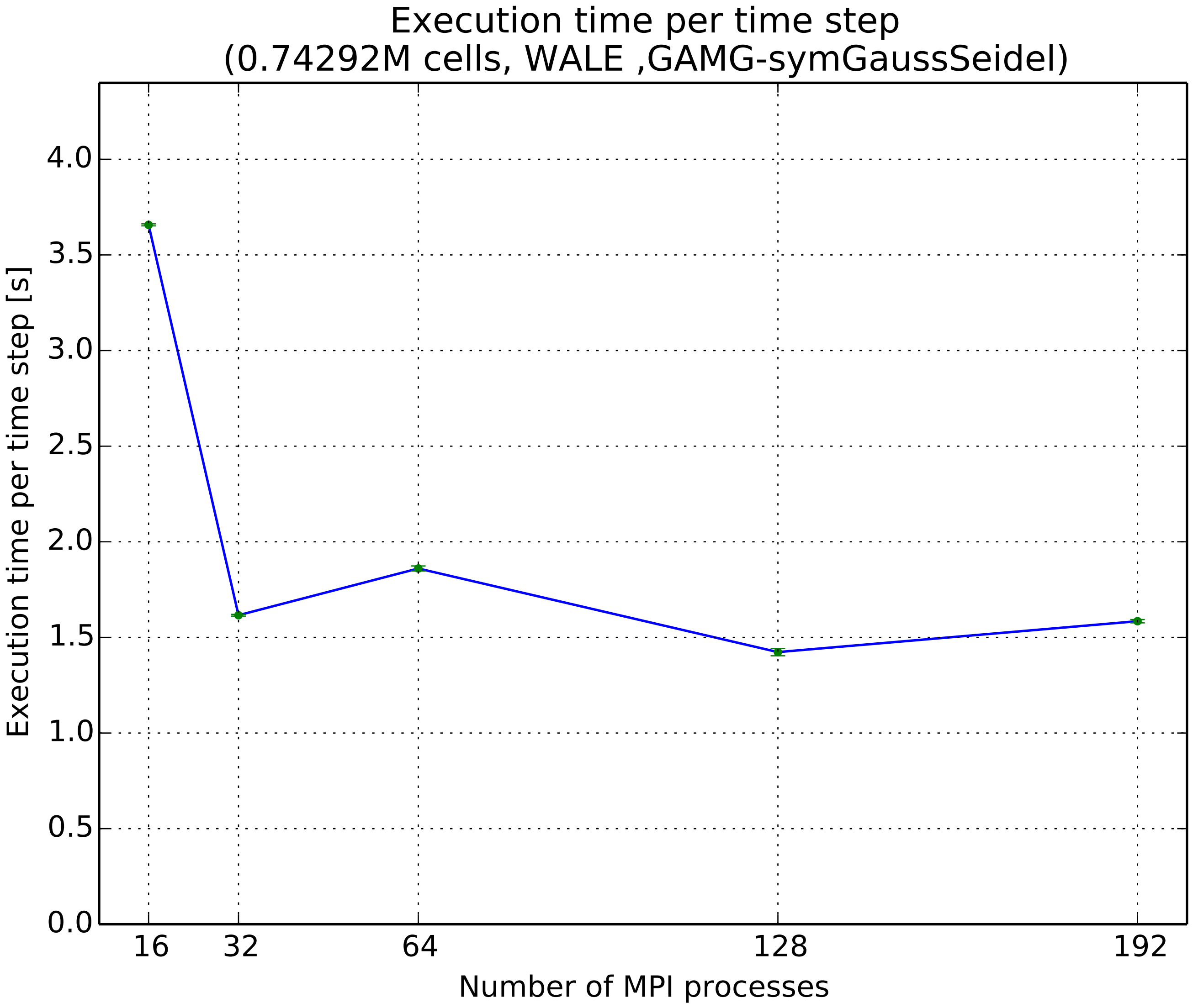
Number of MPI processes


Execution time per time step
(0.74292M cells, WALE ,GAMG-symGaussSeidel)
Execution time per time step [s]
0.0
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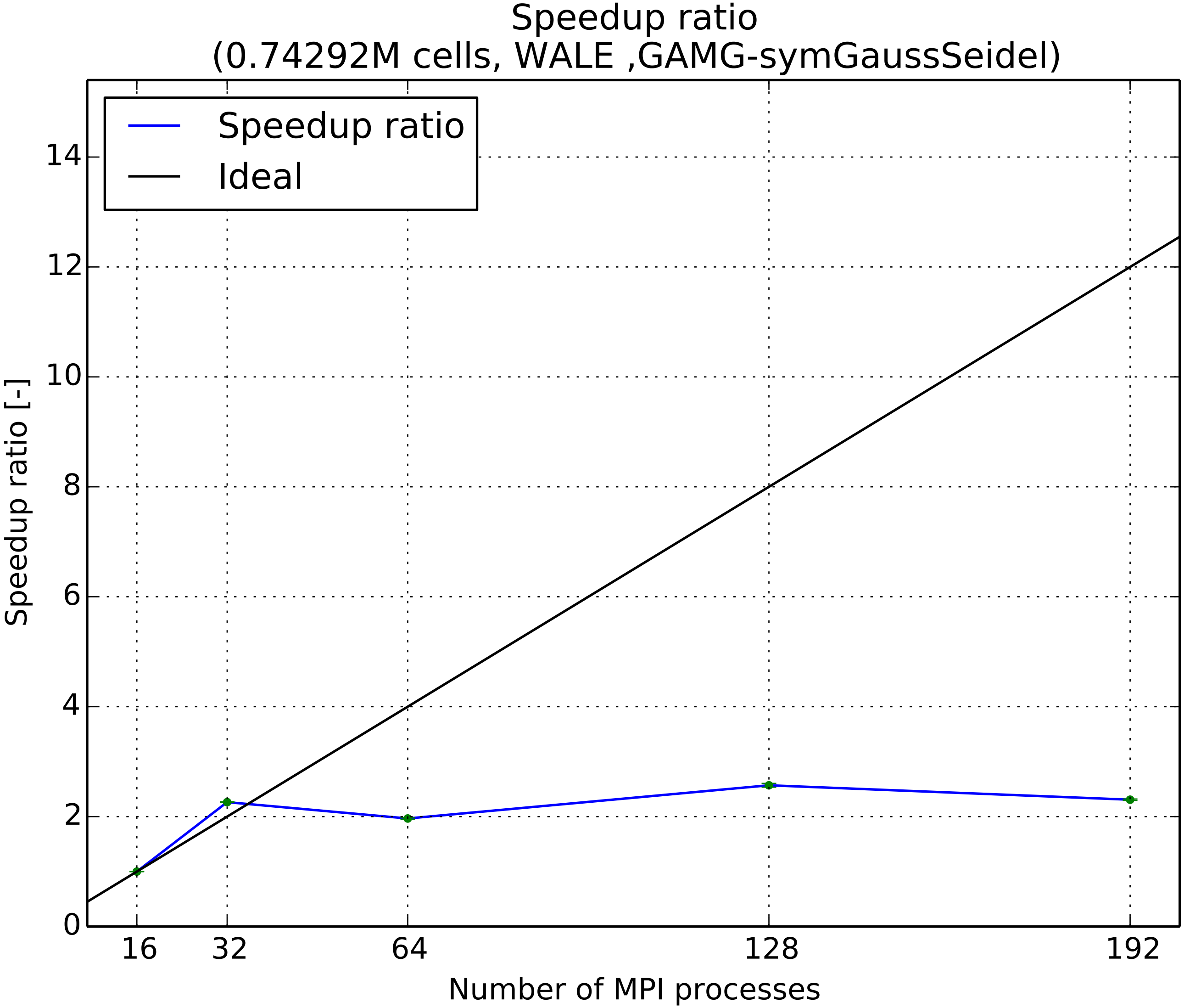
Number of MPI processes


Speedup ratio
(0.74292M cells, WALE ,GAMG-symGaussSeidel)
Speedup ratio
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Speedup ratio [-]
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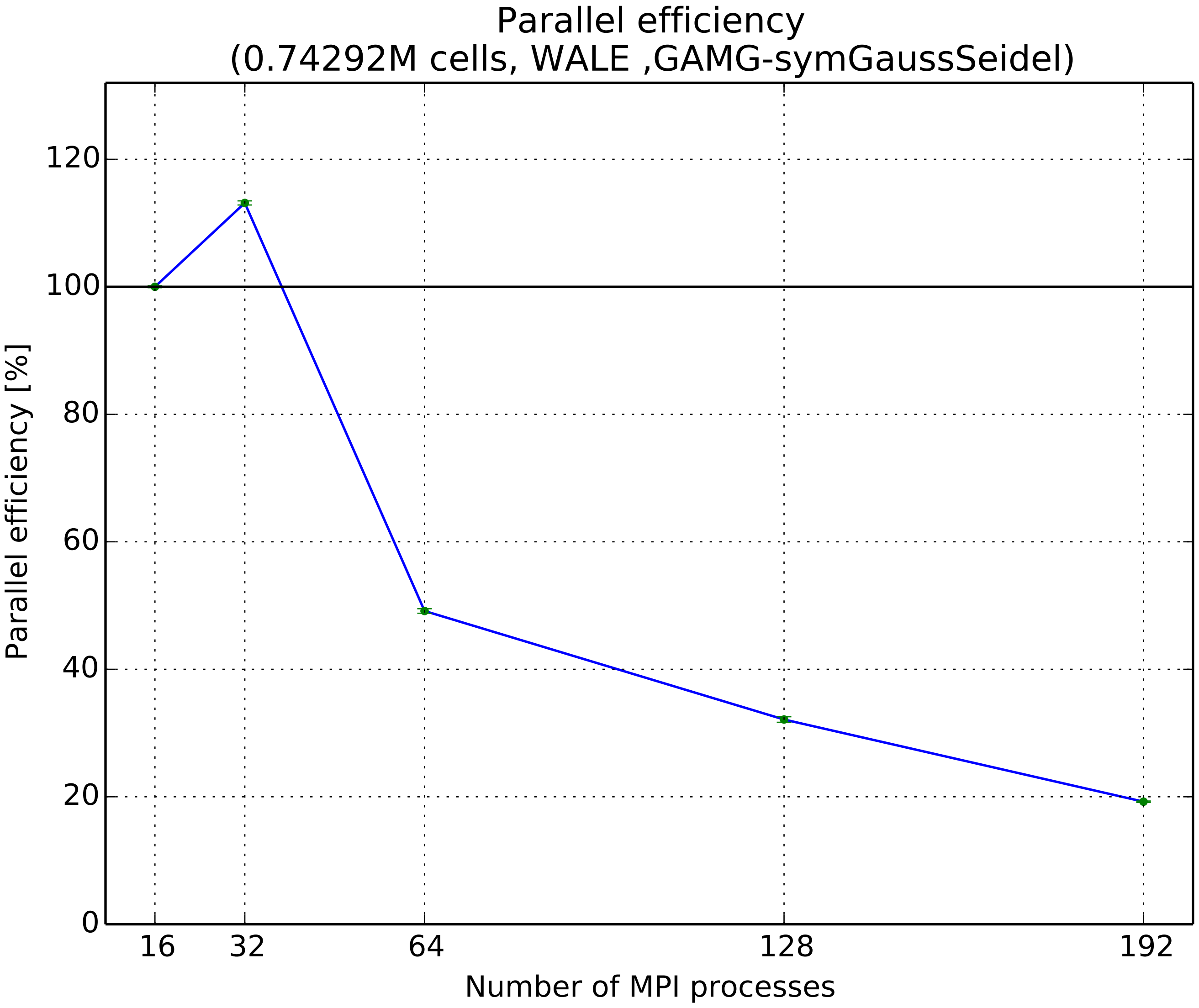
Number of MPI processes


Parallel efficiency
(0.74292M cells, WALE ,GAMG-symGaussSeidel)
Parallel efficiency [%]
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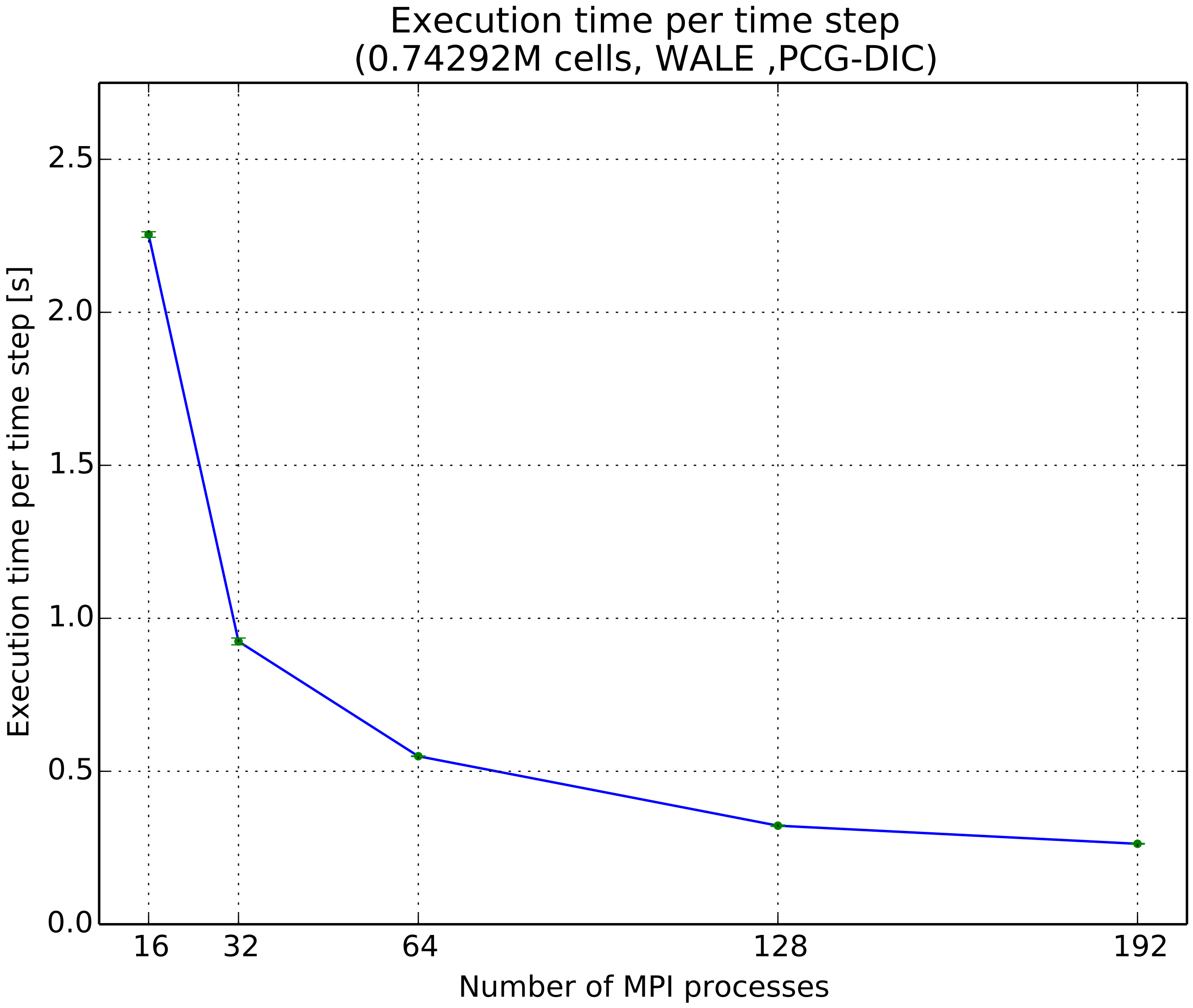
Number of MPI processes


Execution time per time step
(0.74292M cells, WALE ,PCG-DIC)
Execution time per time step [s]
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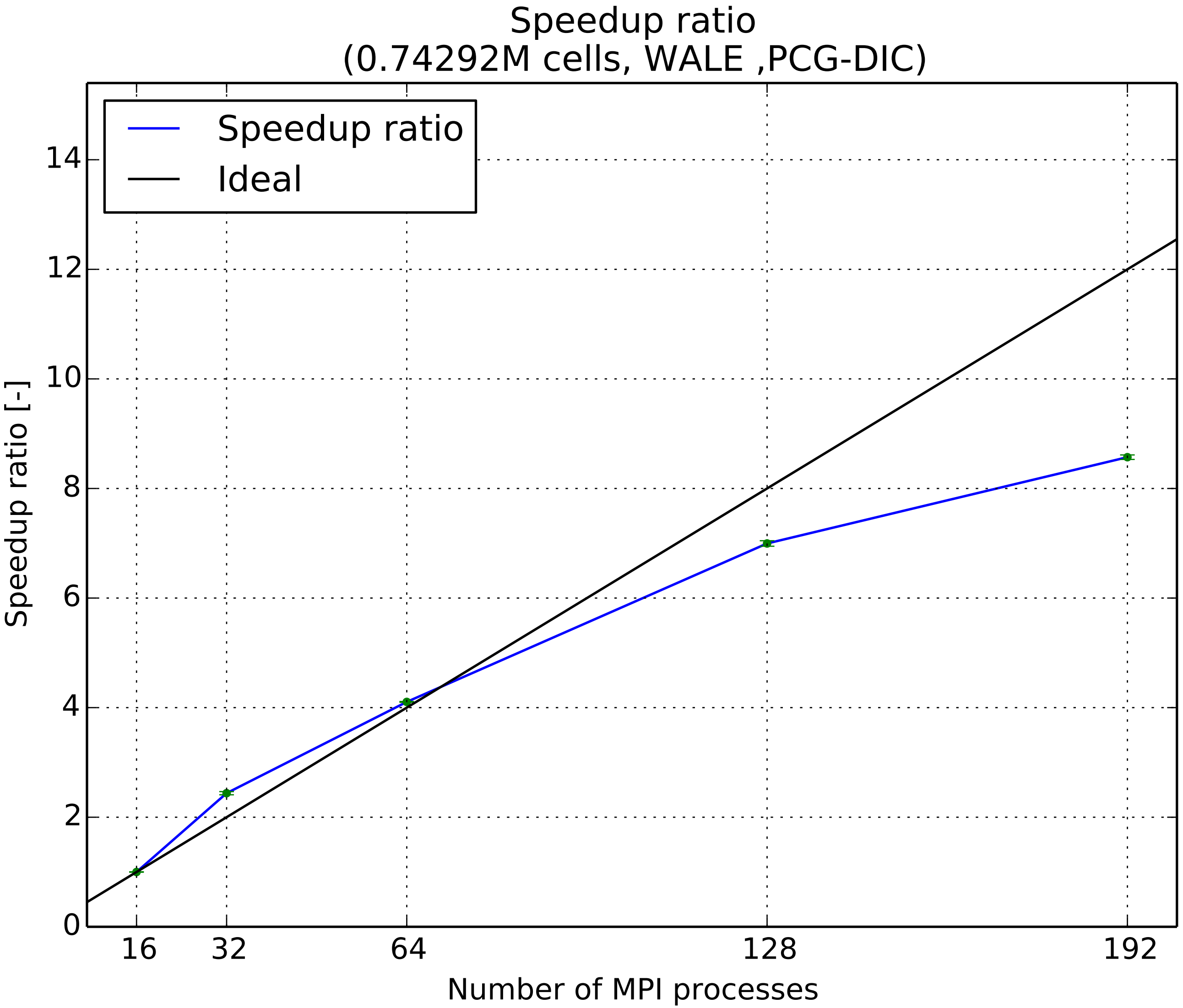
Number of MPI processes


Speedup ratio
(0.74292M cells, WALE ,PCG-DIC)
Speedup ratio
Ideal
Speedup ratio [-]
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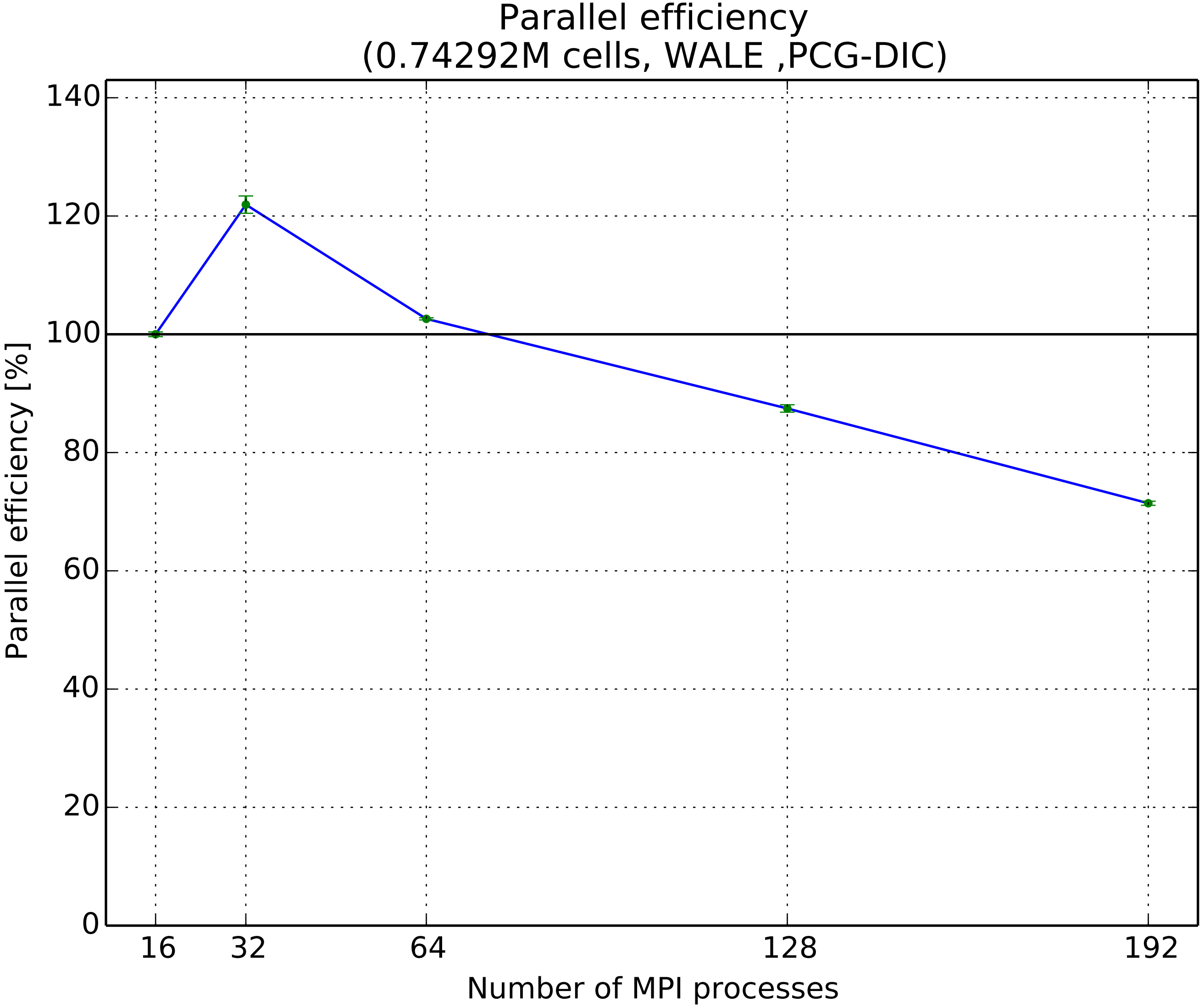
Number of MPI processes


Parallel efficiency
(0.74292M cells, WALE ,PCG-DIC)
Parallel efficiency [%]
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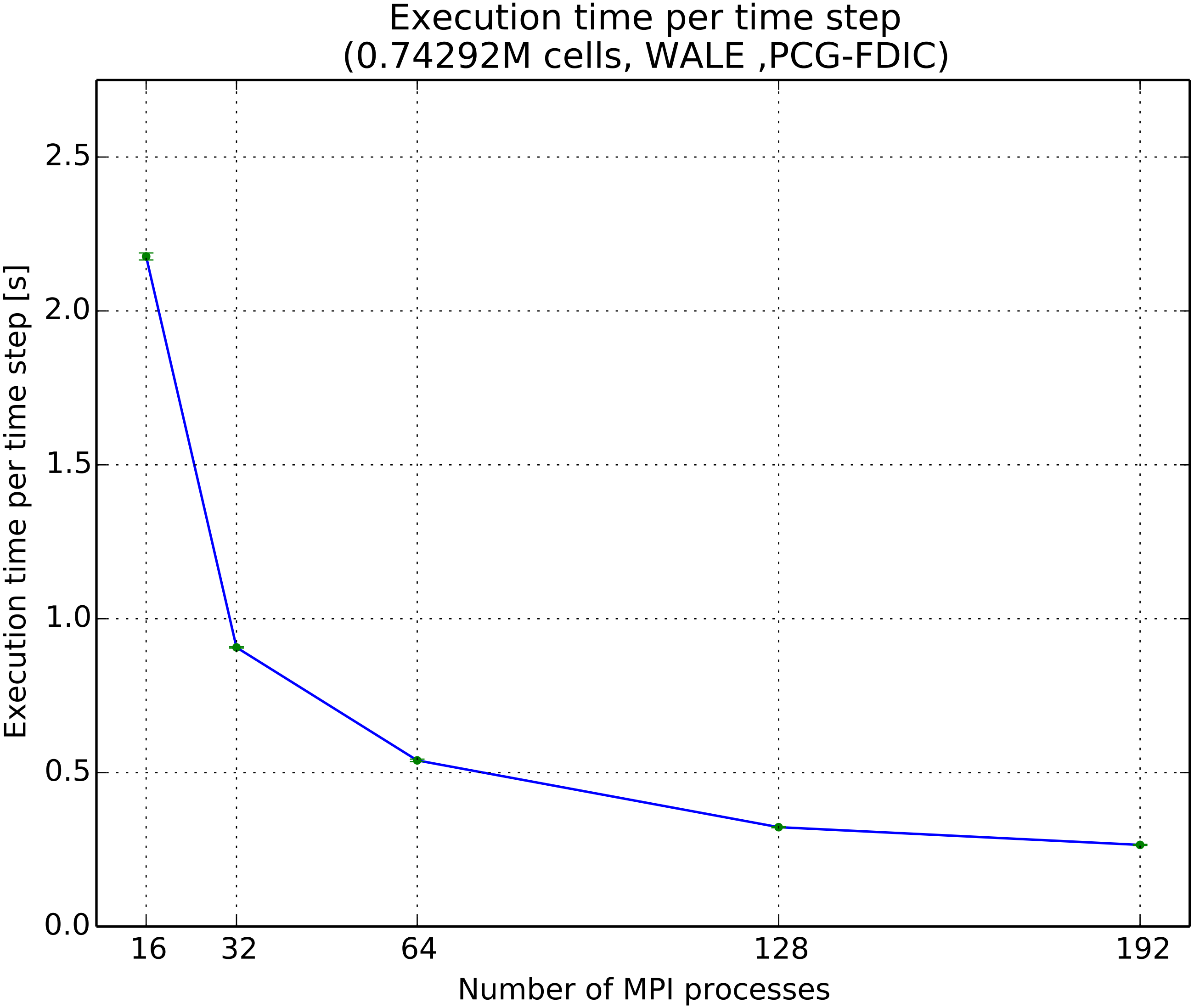
Number of MPI processes


Execution time per time step
(0.74292M cells, WALE ,PCG-FDIC)
Execution time per time step [s]
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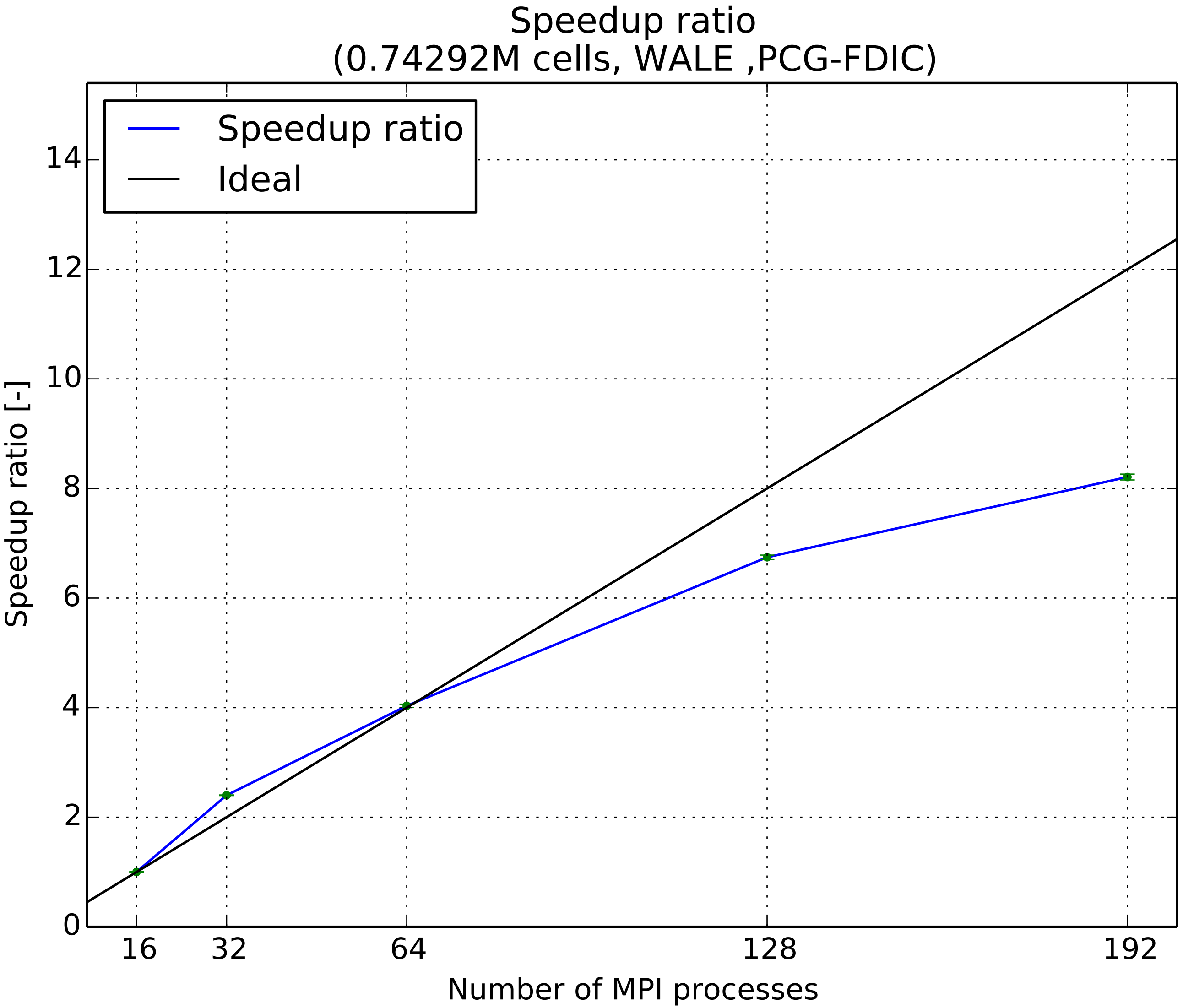
Number of MPI processes


Speedup ratio
(0.74292M cells, WALE ,PCG-FDIC)
Speedup ratio
Ideal
Speedup ratio [-]
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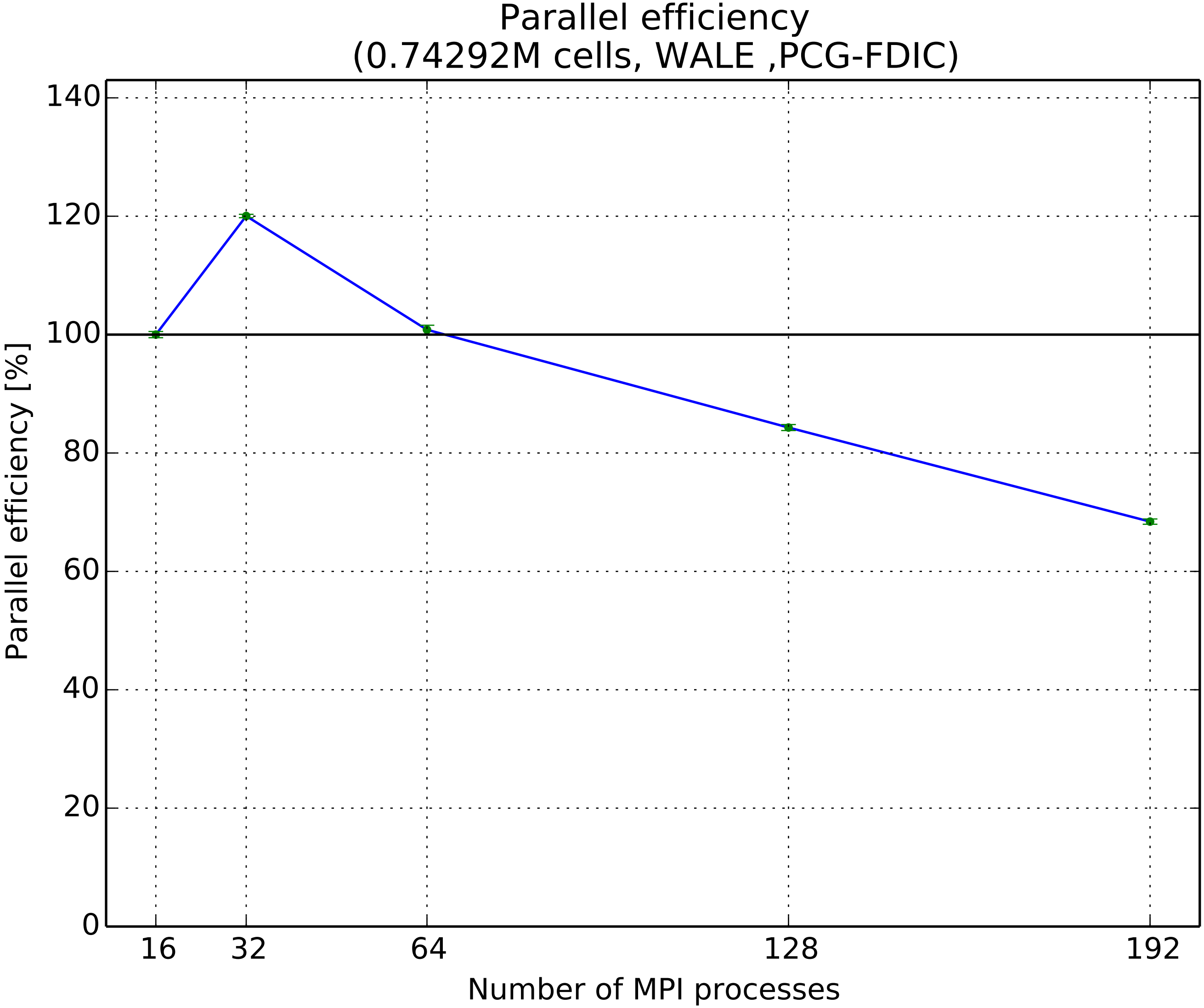
Number of MPI processes


Parallel efficiency
(0.74292M cells, WALE ,PCG-FDIC)
Parallel efficiency [%]
0
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80
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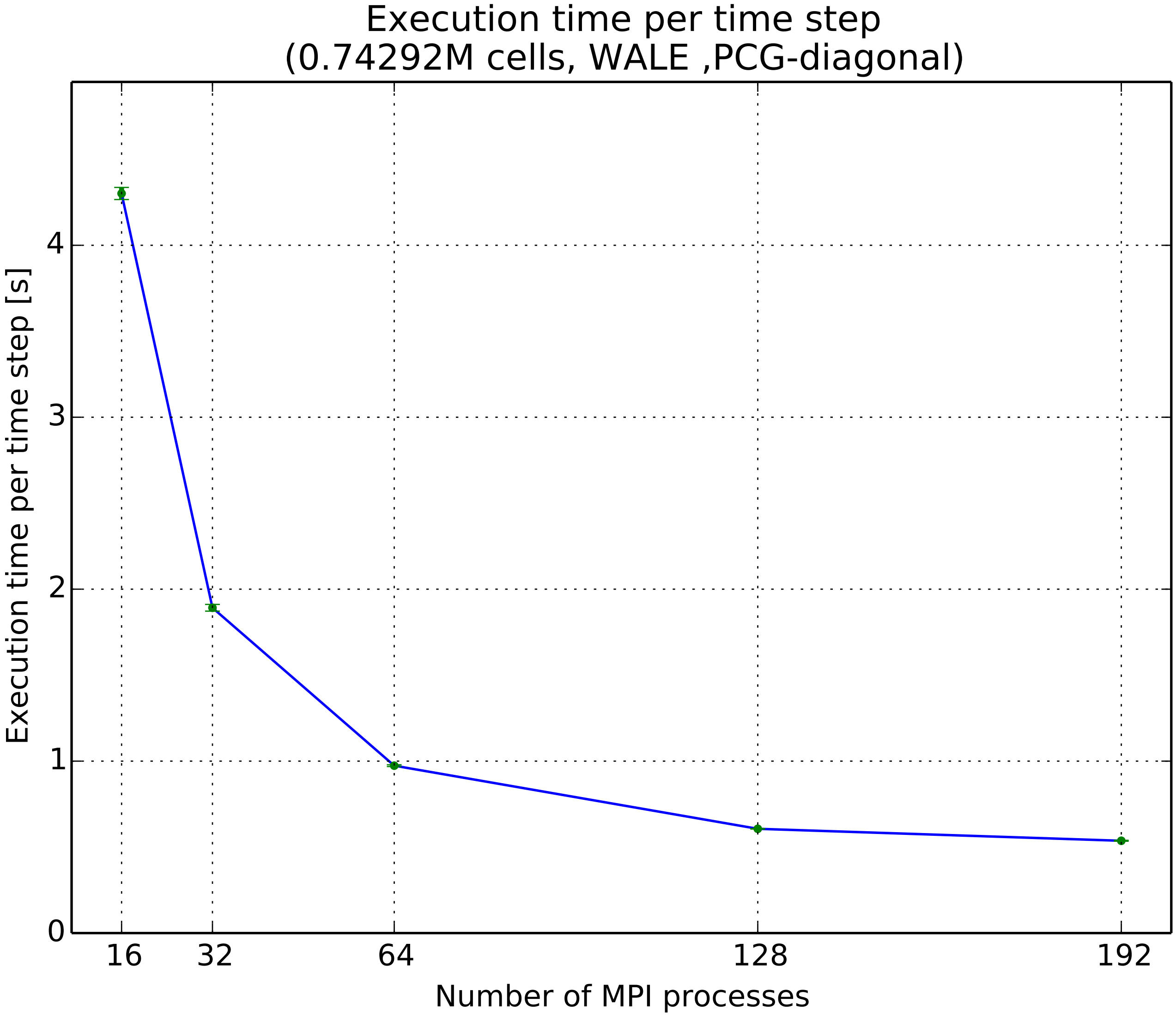
128
192
Number of MPI processes


Execution time per time step
(0.74292M cells, WALE ,PCG-diagonal)
Execution time per time step [s]
0
1
2
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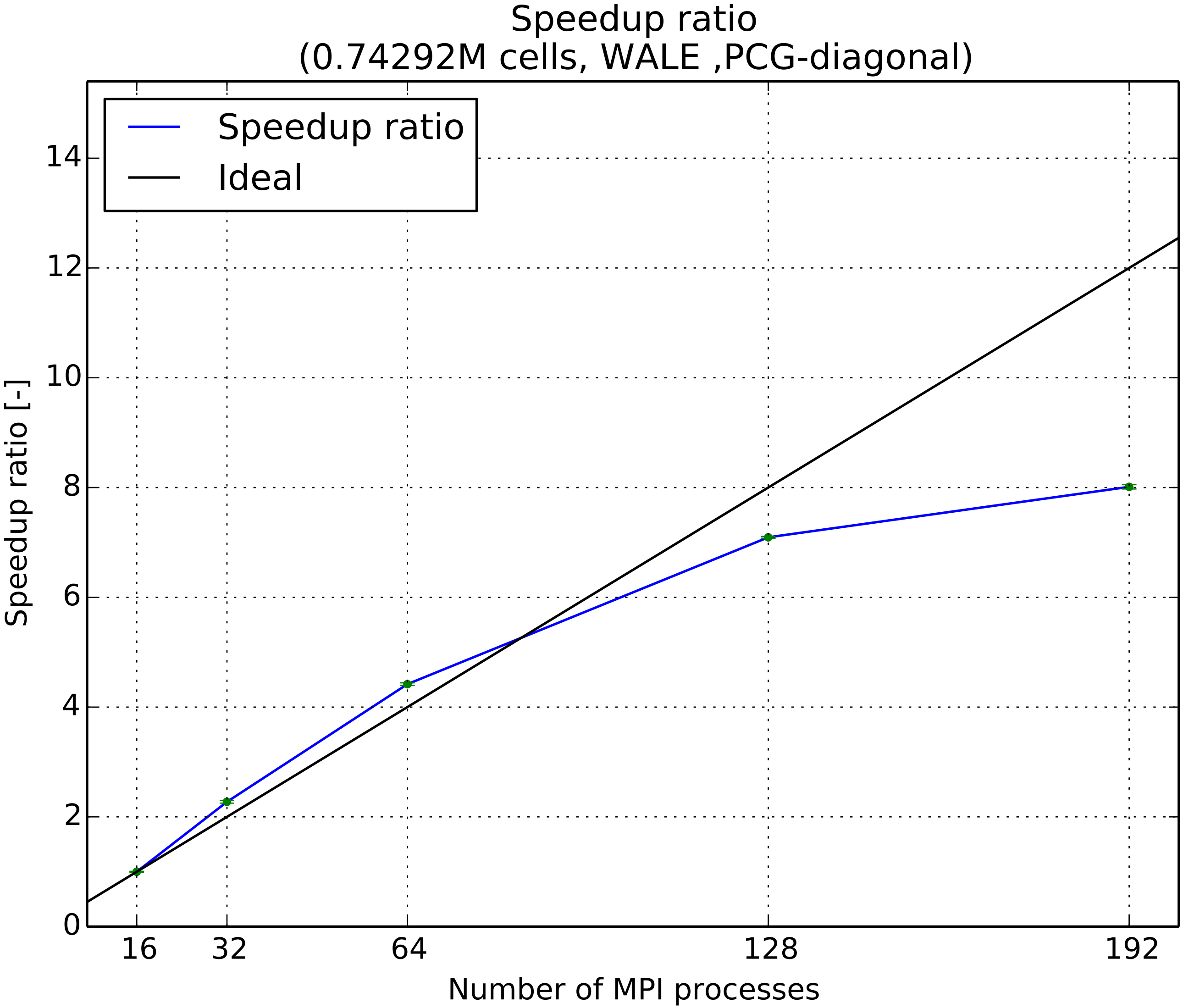
64
128
192
Number of MPI processes


Speedup ratio
(0.74292M cells, WALE ,PCG-diagonal)
Speedup ratio
Ideal
Speedup ratio [-]
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128
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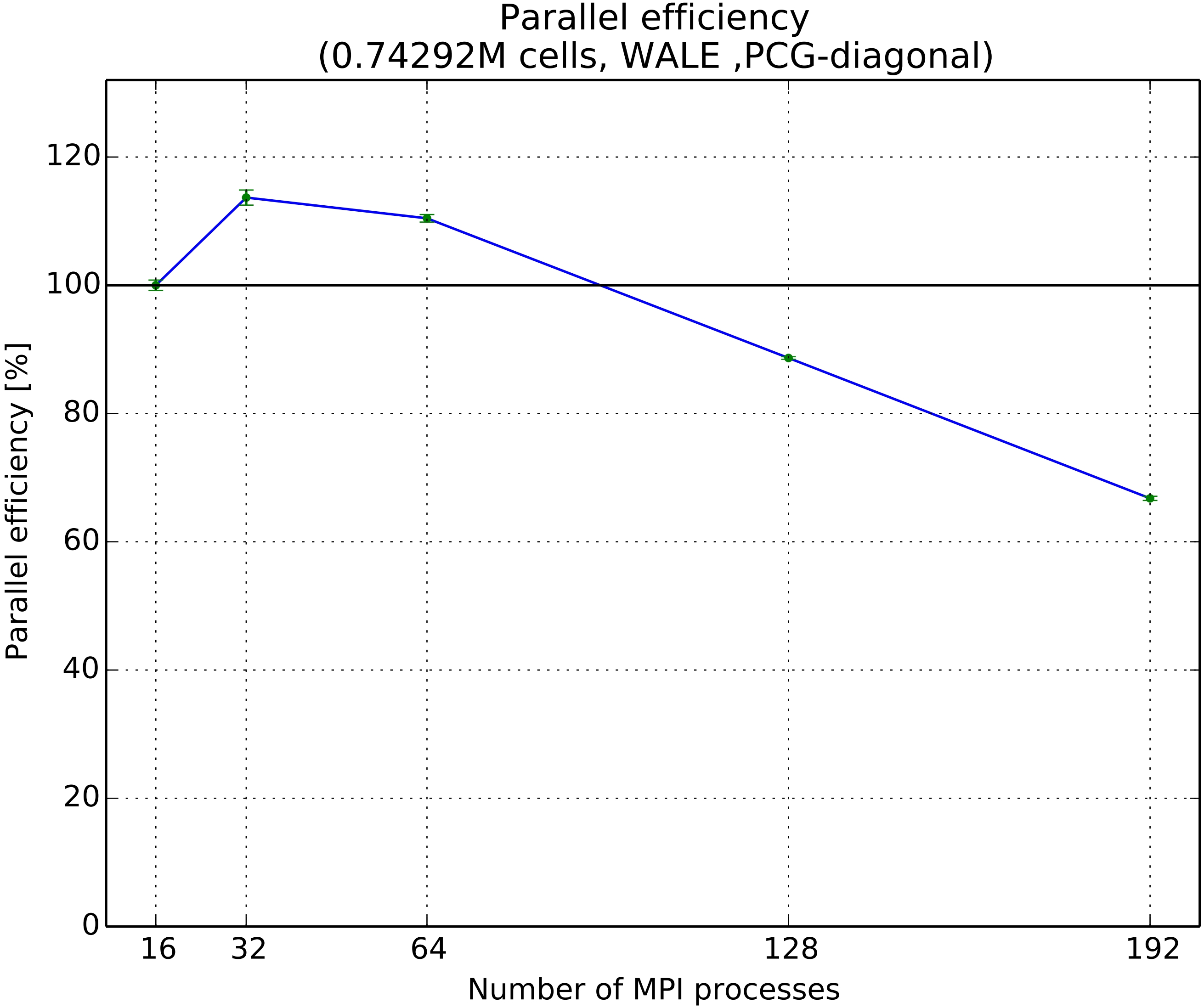
Number of MPI processes


Parallel efficiency
(0.74292M cells, WALE ,PCG-diagonal)
Parallel efficiency [%]
0
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80
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120
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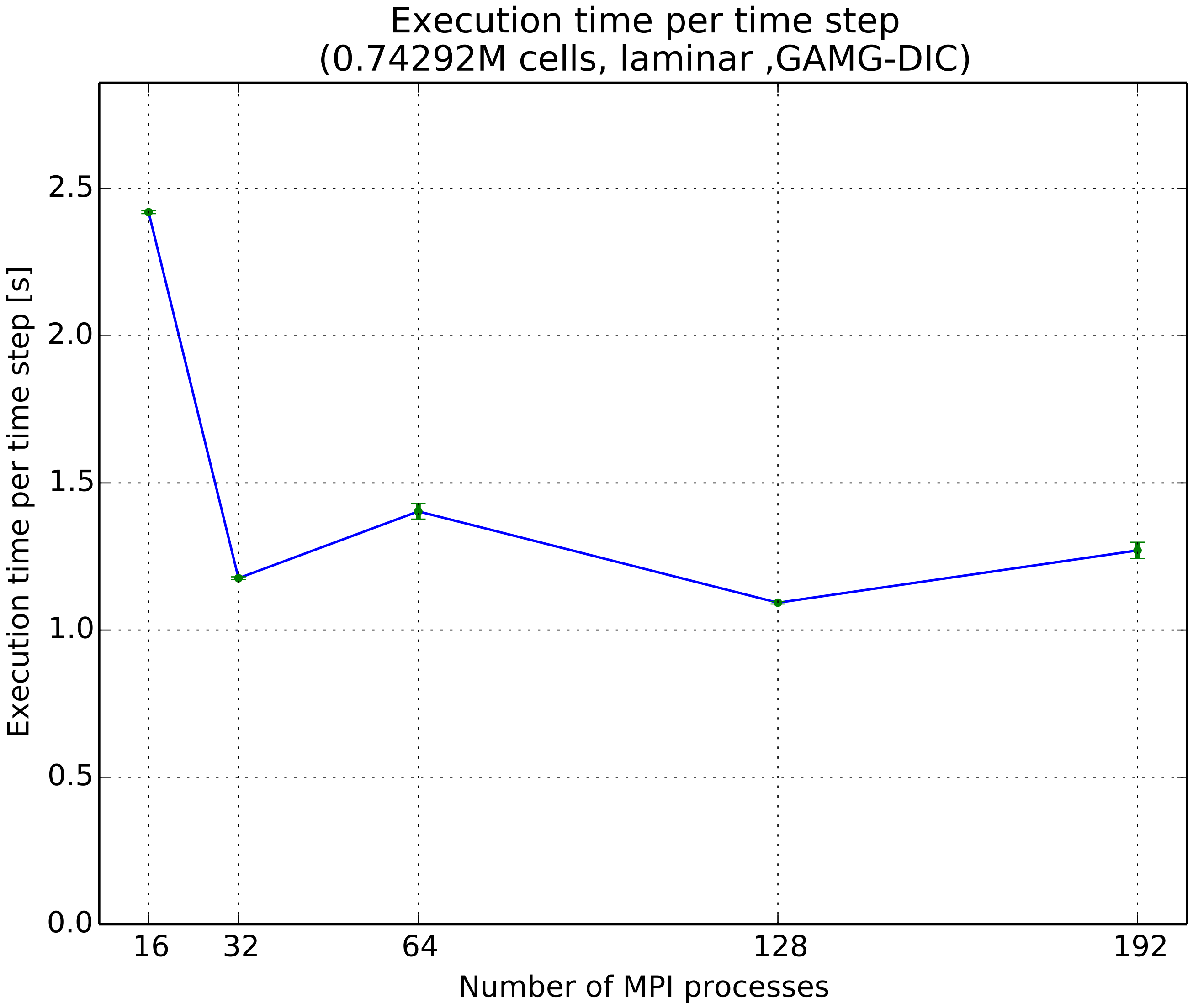
128
192
Number of MPI processes


Execution time per time step
(0.74292M cells, laminar ,GAMG-DIC)
Execution time per time step [s]
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0.5
1.0
1.5
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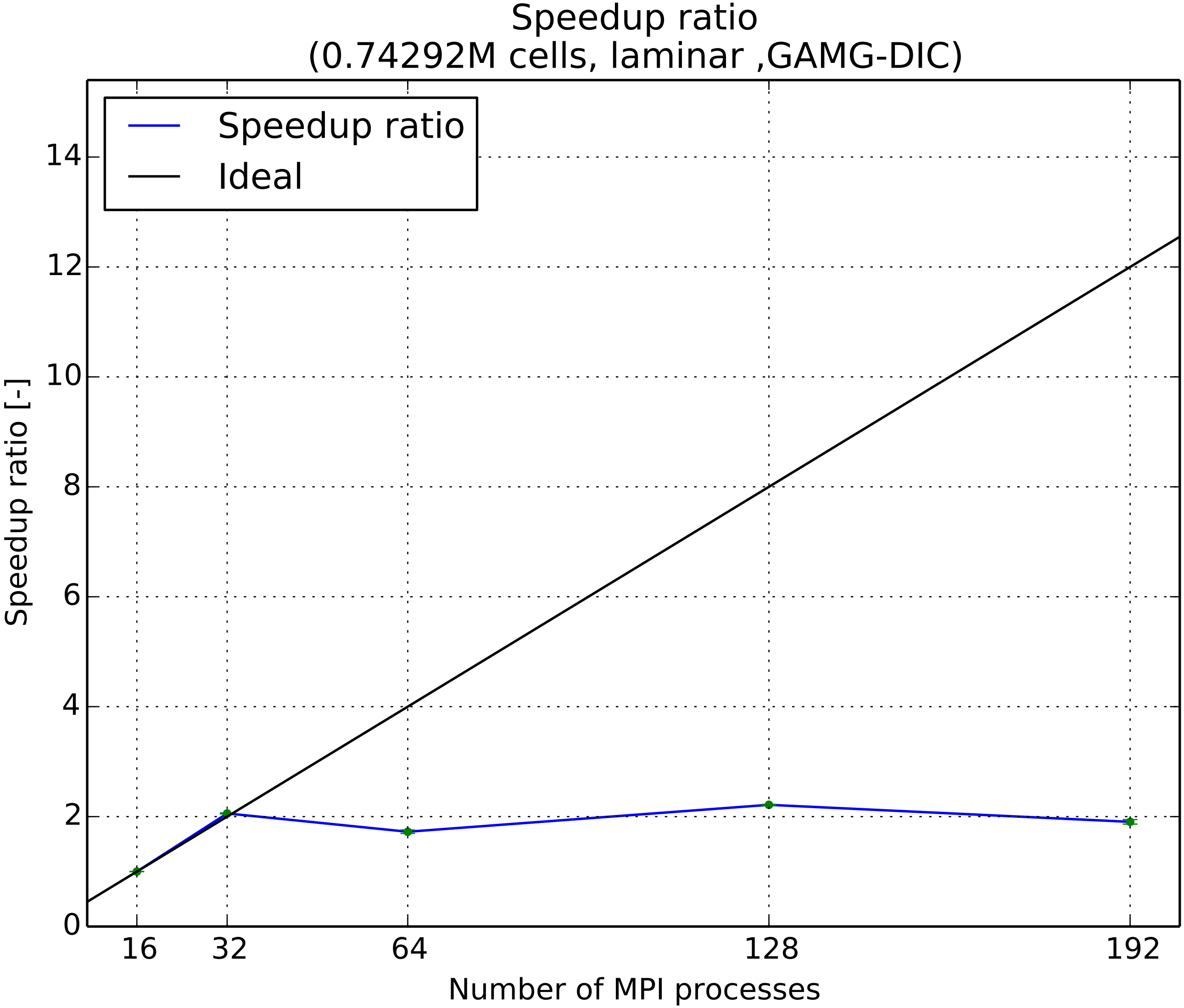
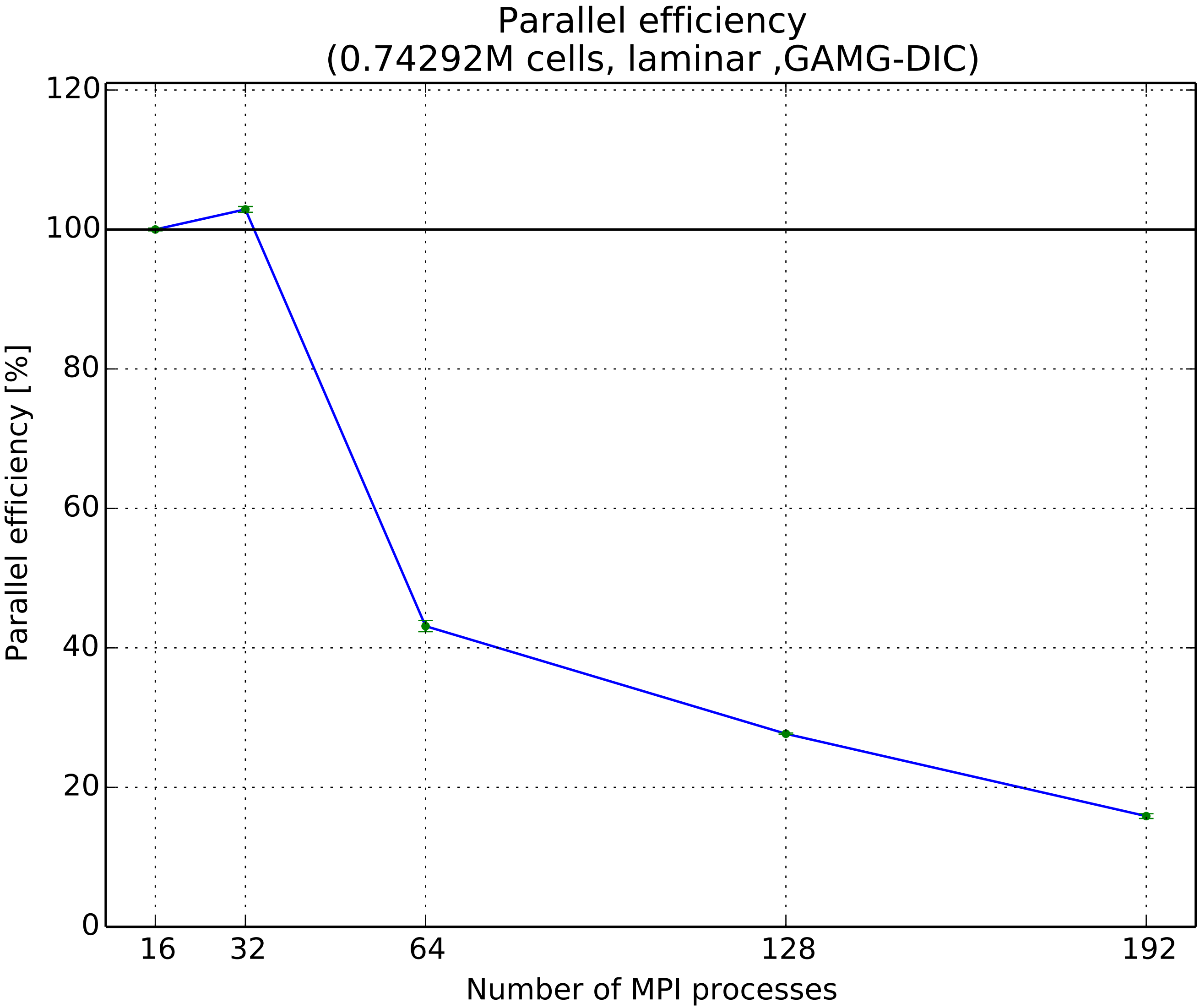
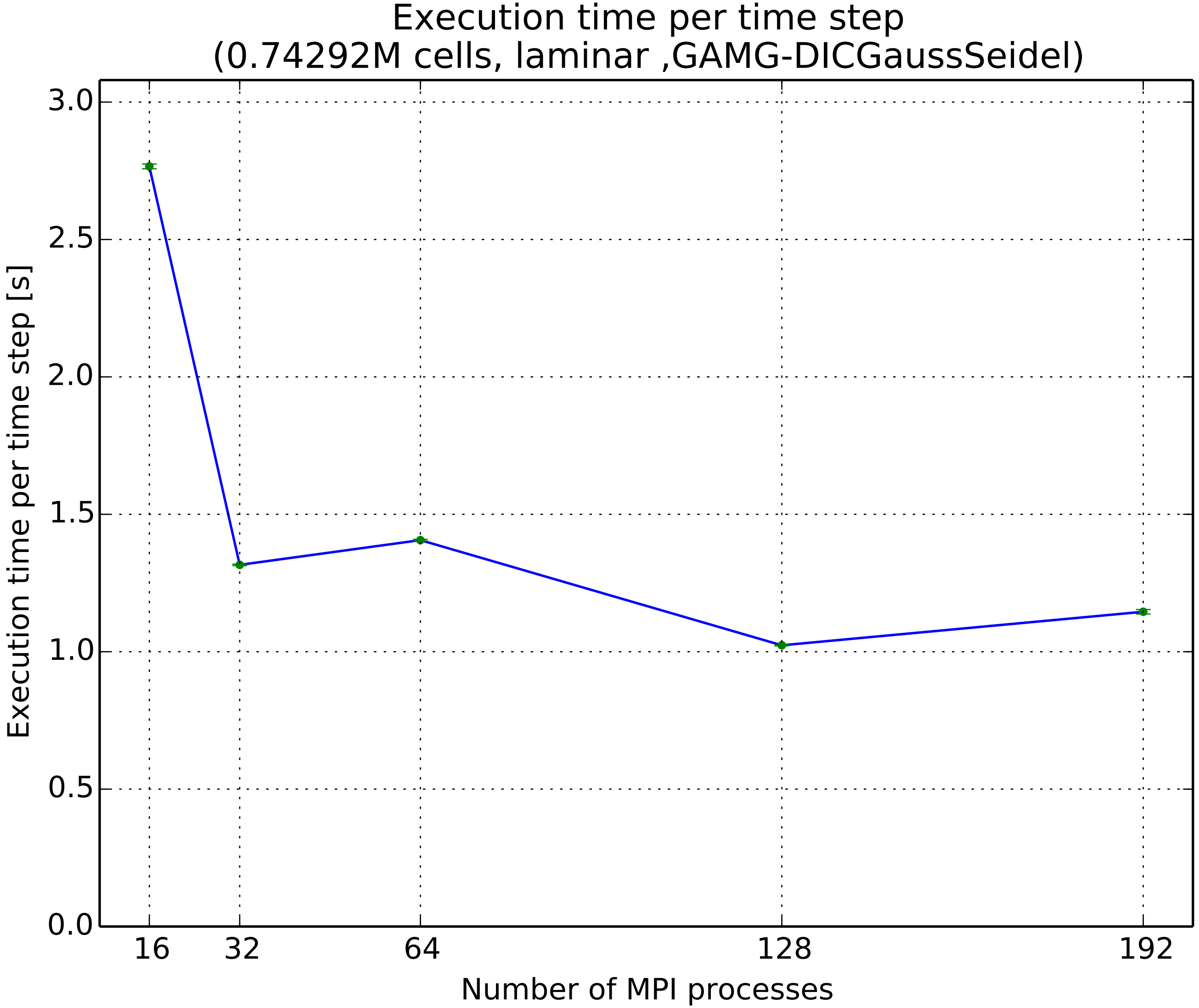
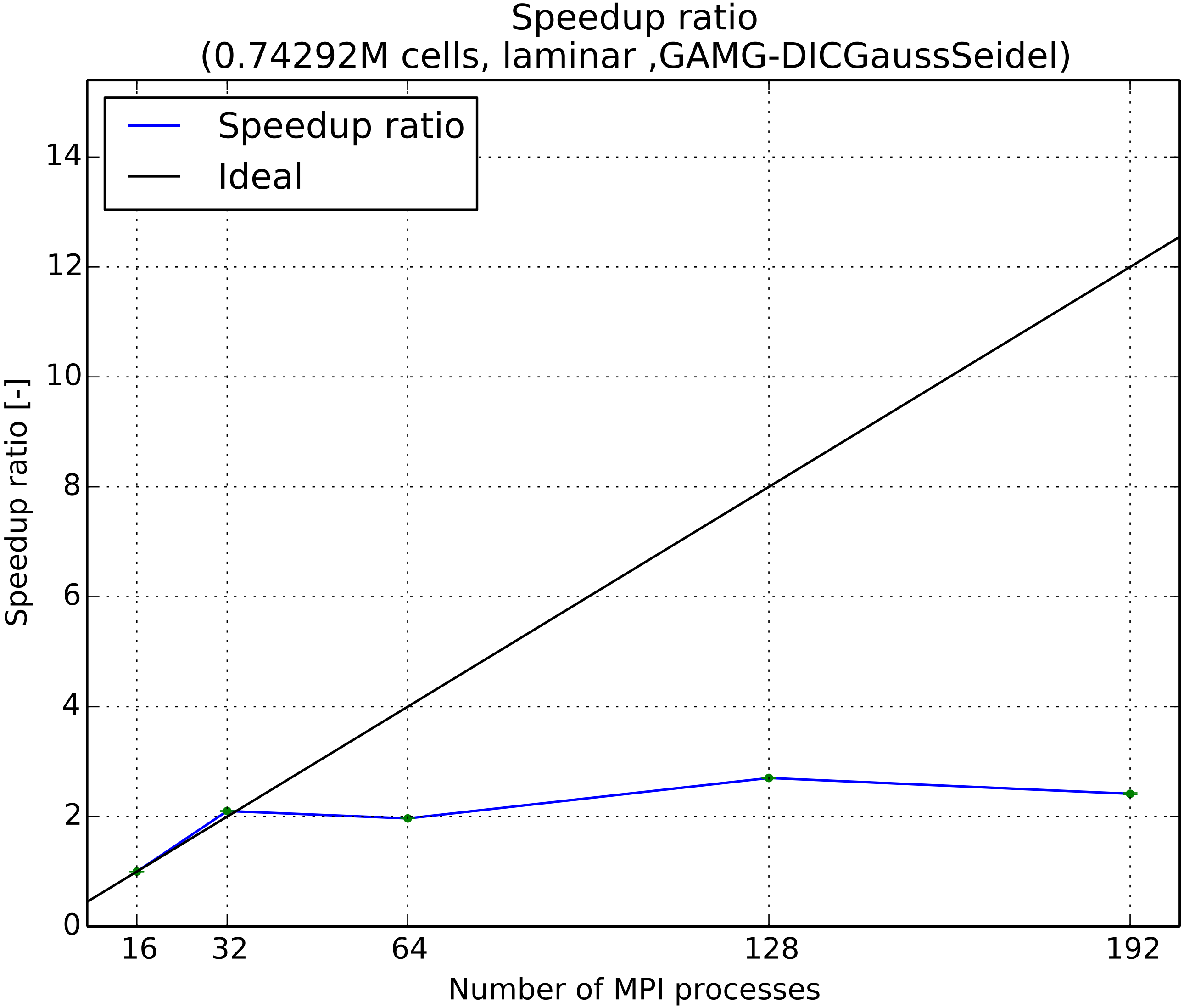
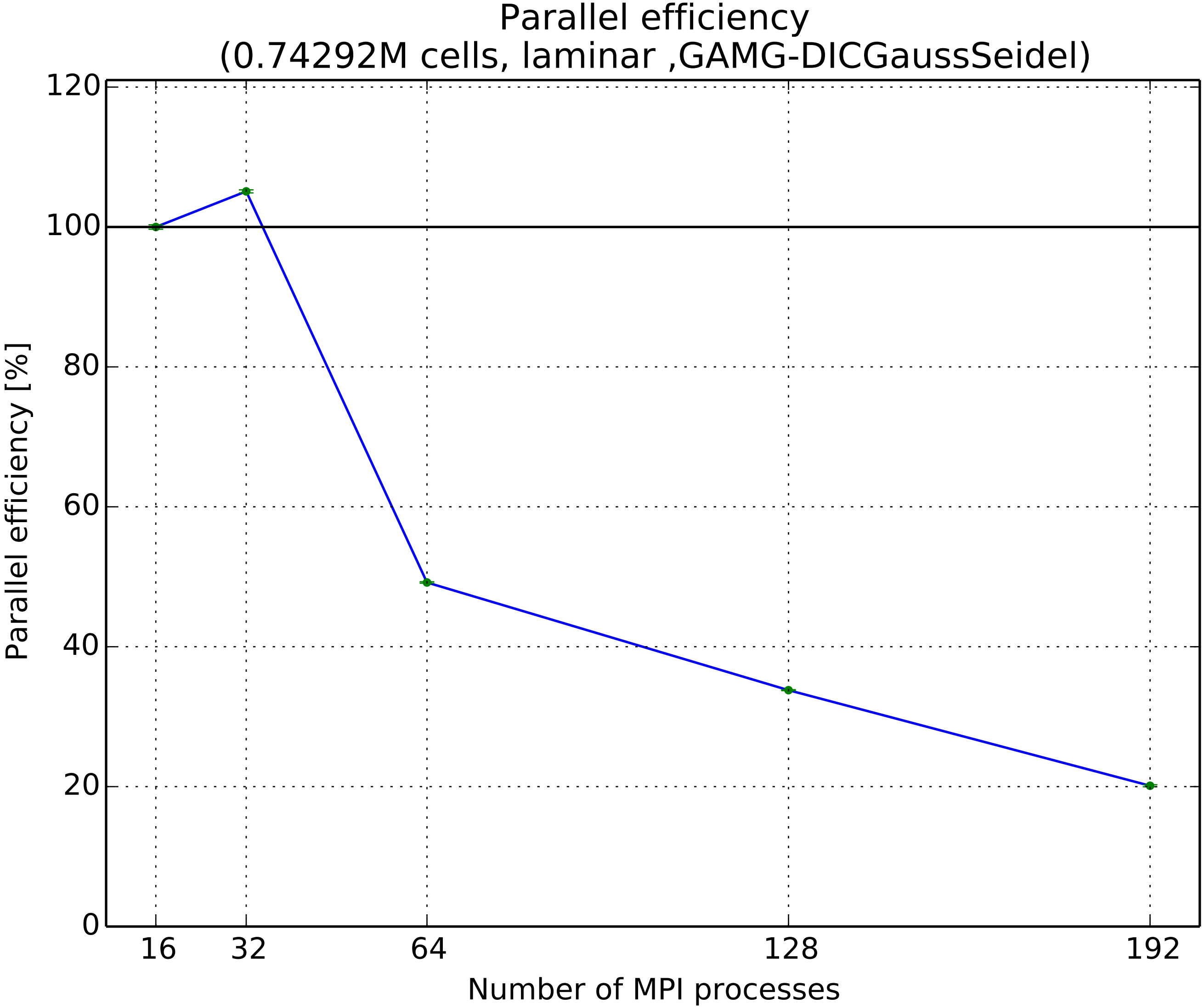
128
192
Number of MPI processes

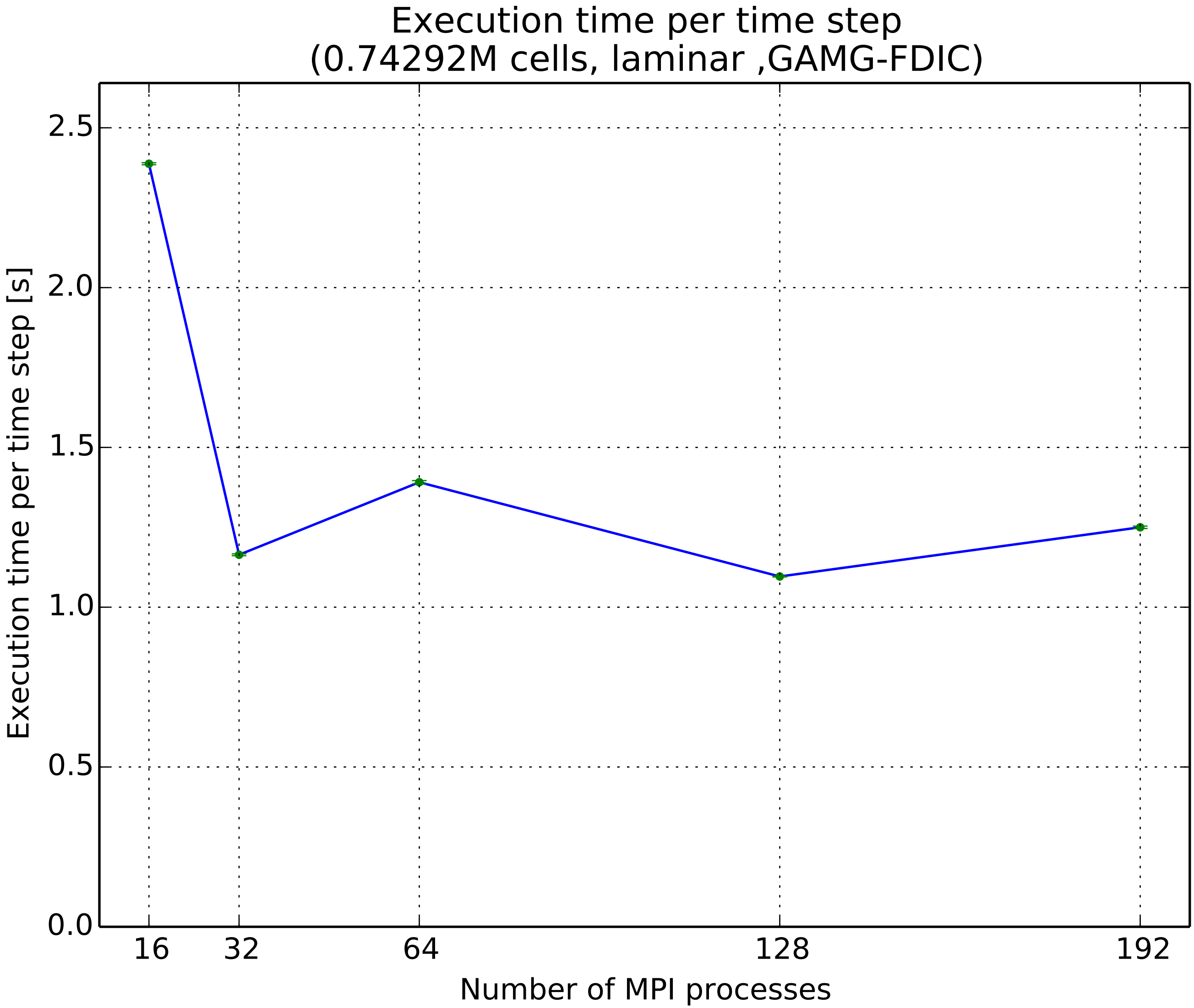

Speedup ratio
(0.74292M cells, laminar ,GAMG-DIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

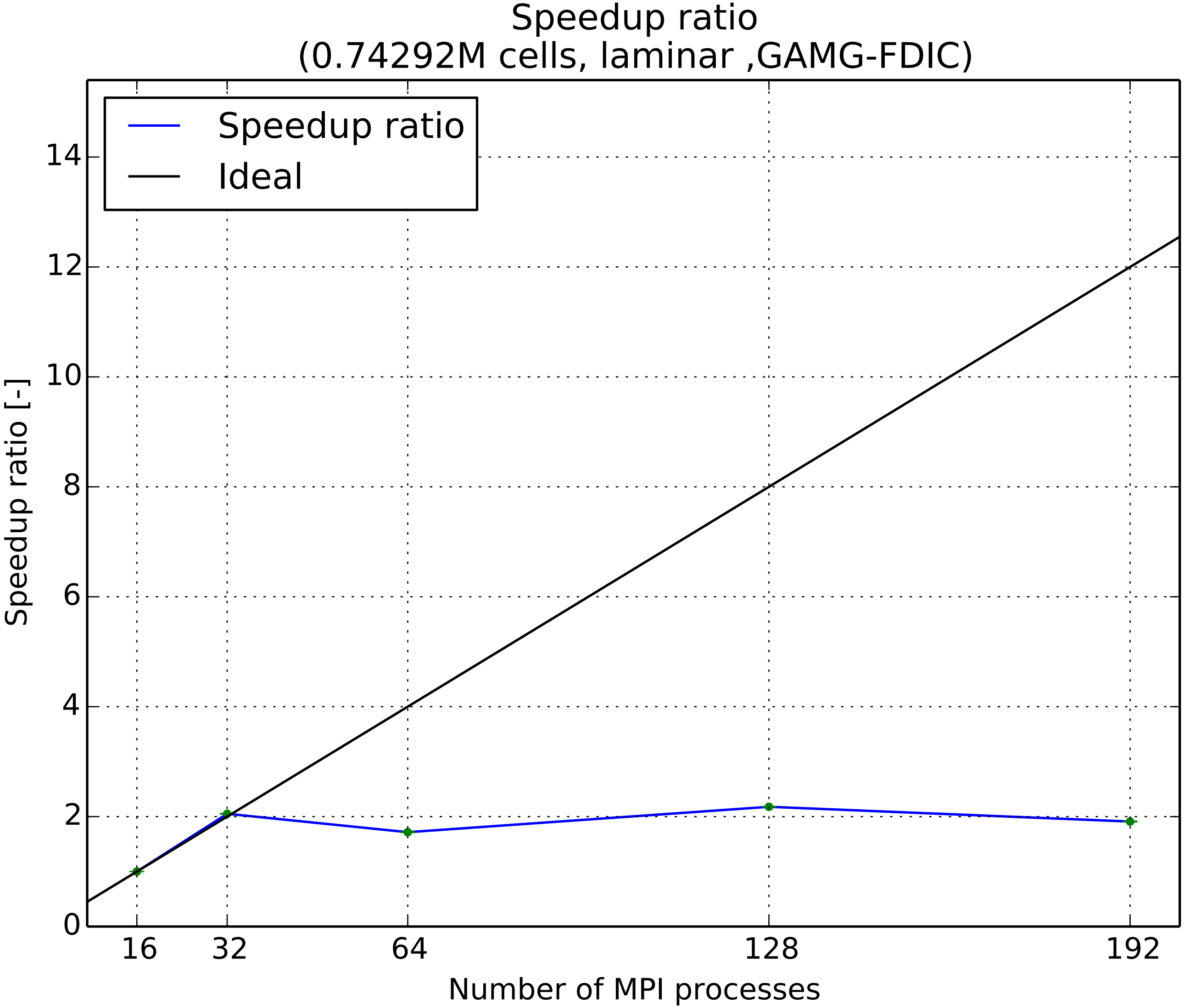

Parallel efficiency
(0.74292M cells, laminar ,GAMG-DIC)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes

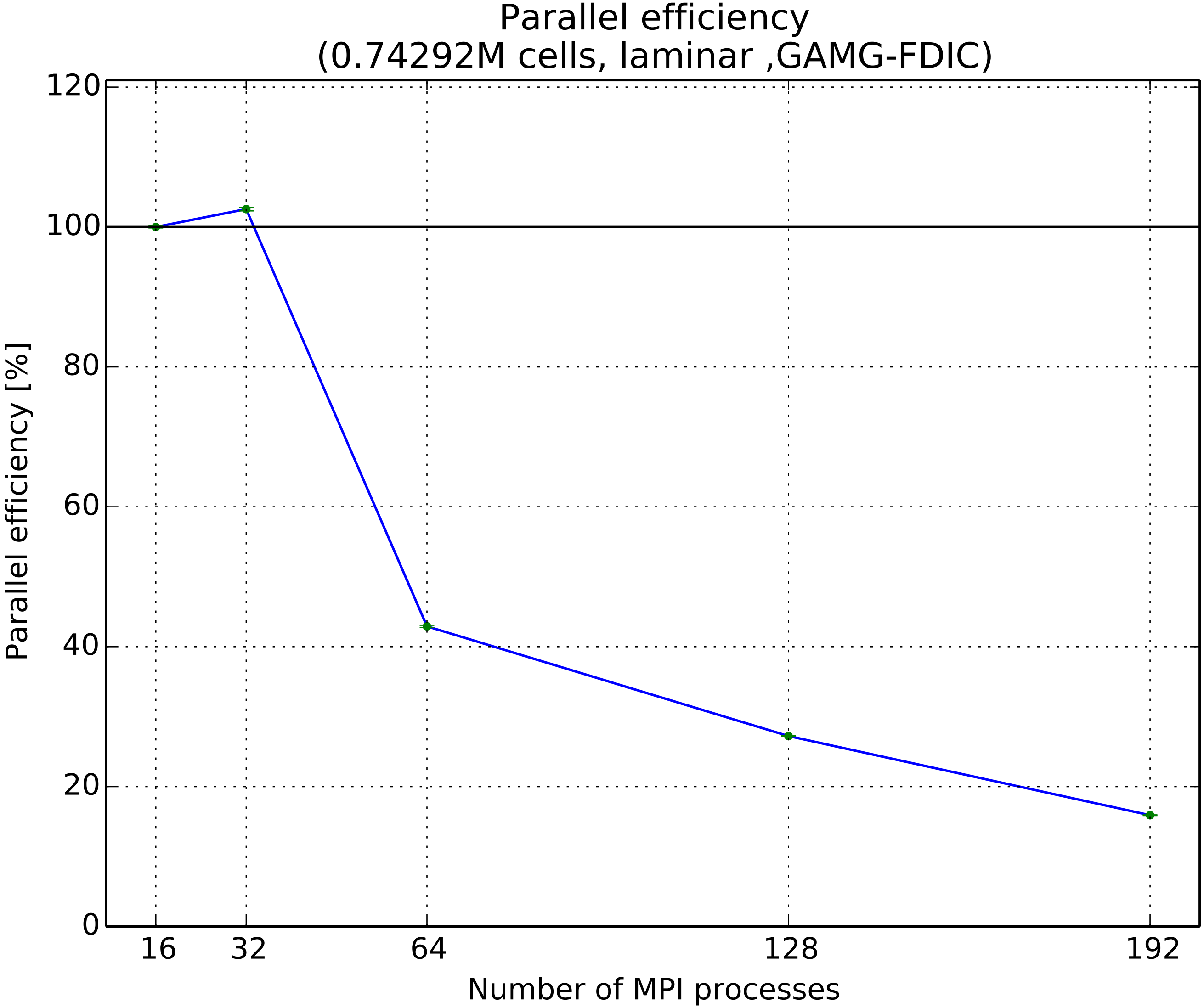

Execution time per time step
(0.74292M cells, laminar ,GAMG-DICGaussSeidel)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
16
32
64
128
192
Number of MPI processes

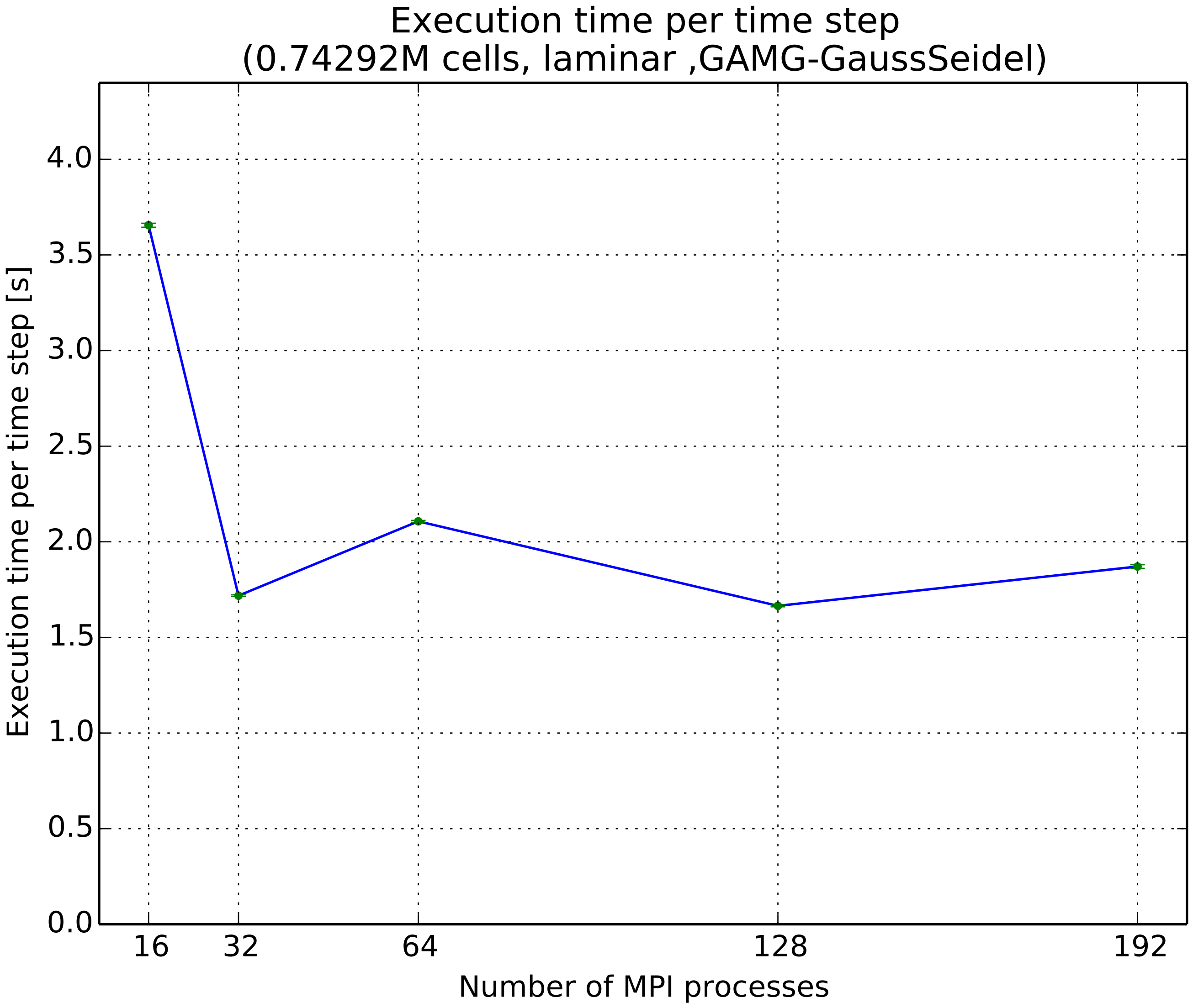

Speedup ratio
(0.74292M cells, laminar ,GAMG-DICGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

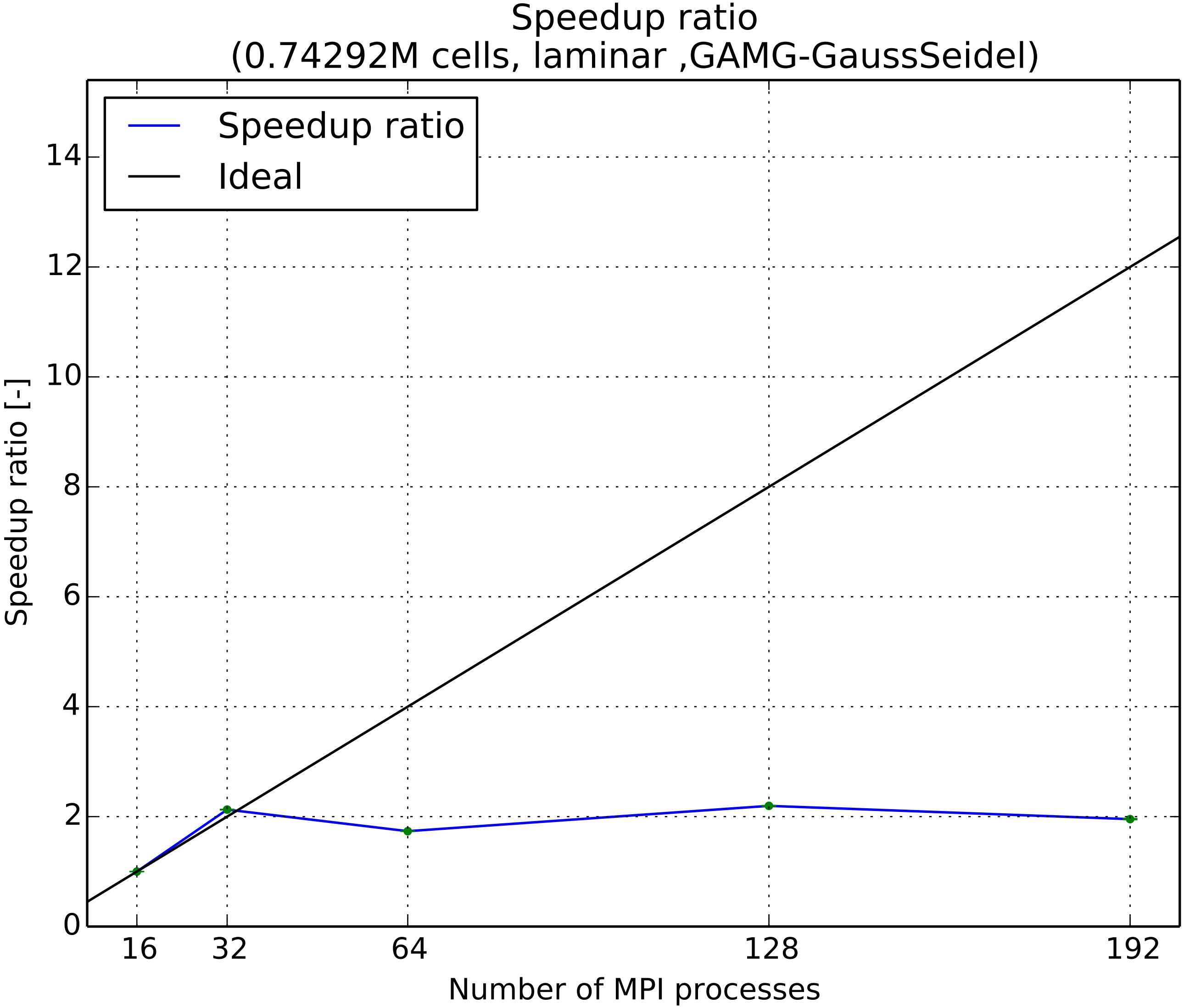

Parallel efficiency
(0.74292M cells, laminar ,GAMG-DICGaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes


Execution time per time step
(0.74292M cells, laminar ,GAMG-FDIC)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
16
32
64
128
192
Number of MPI processes


Speedup ratio
(0.74292M cells, laminar ,GAMG-FDIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes


Parallel efficiency
(0.74292M cells, laminar ,GAMG-FDIC)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes


Execution time per time step
(0.74292M cells, laminar ,GAMG-GaussSeidel)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
16
32
64
128
192
Number of MPI processes


Speedup ratio
(0.74292M cells, laminar ,GAMG-GaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
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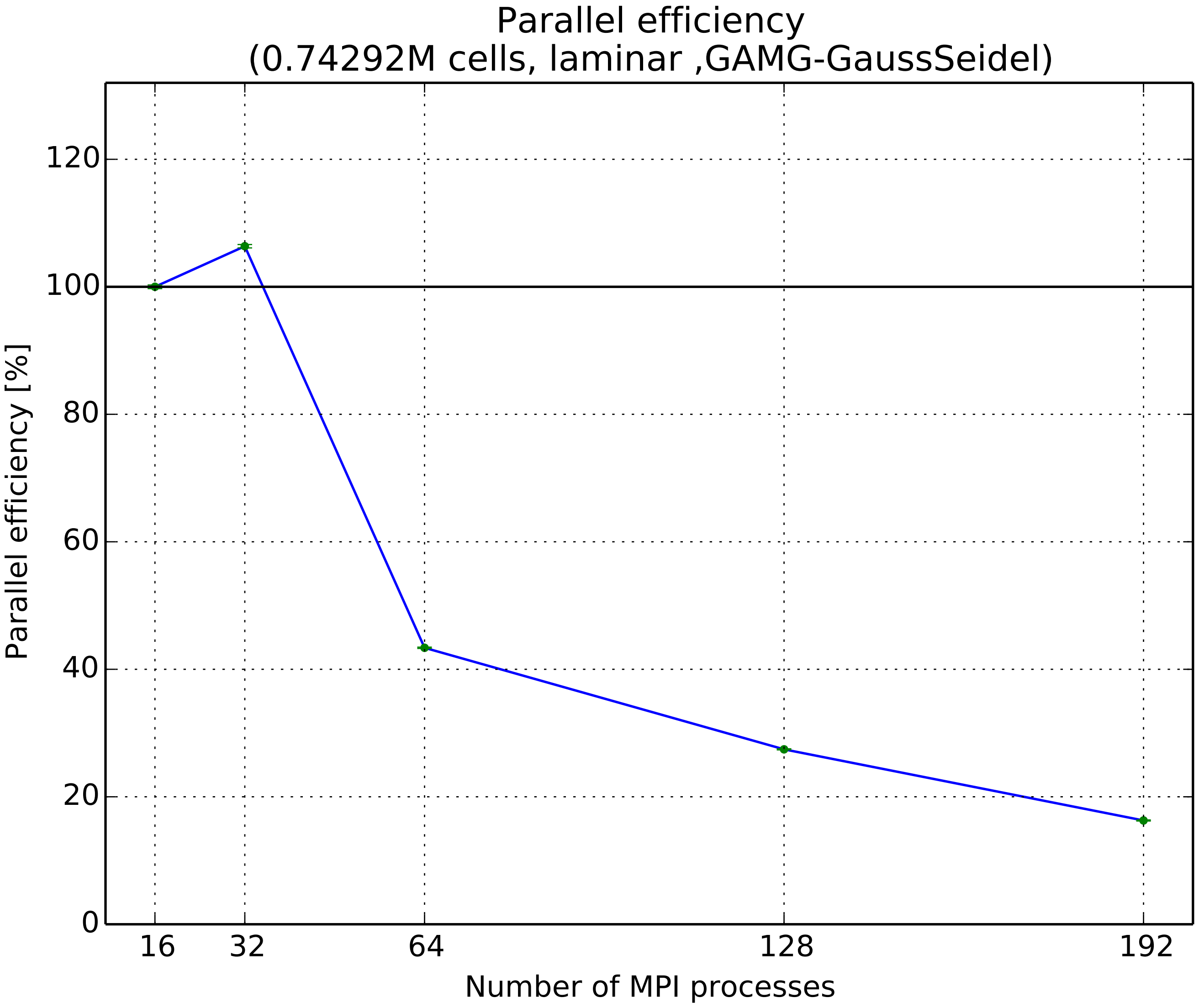
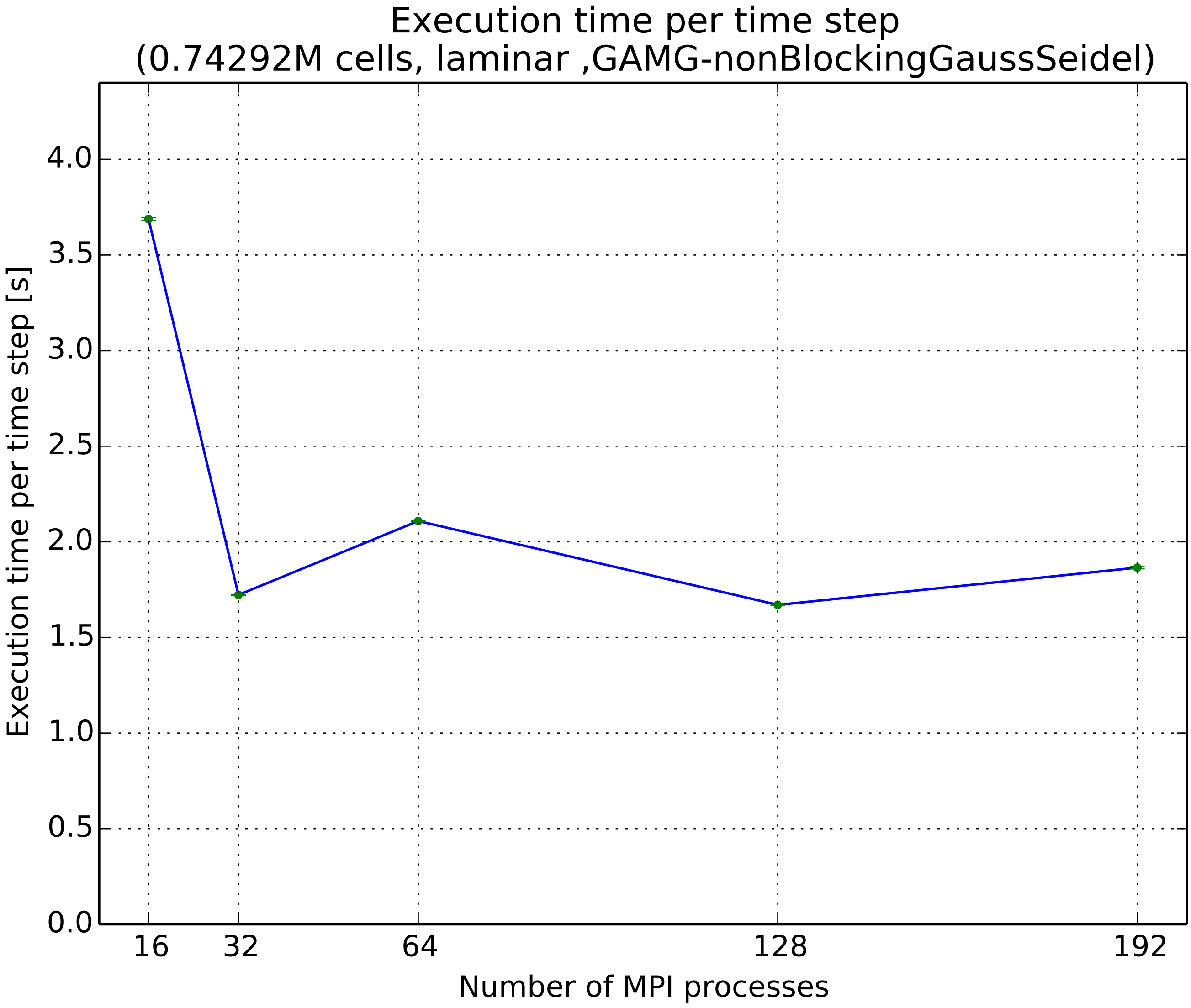
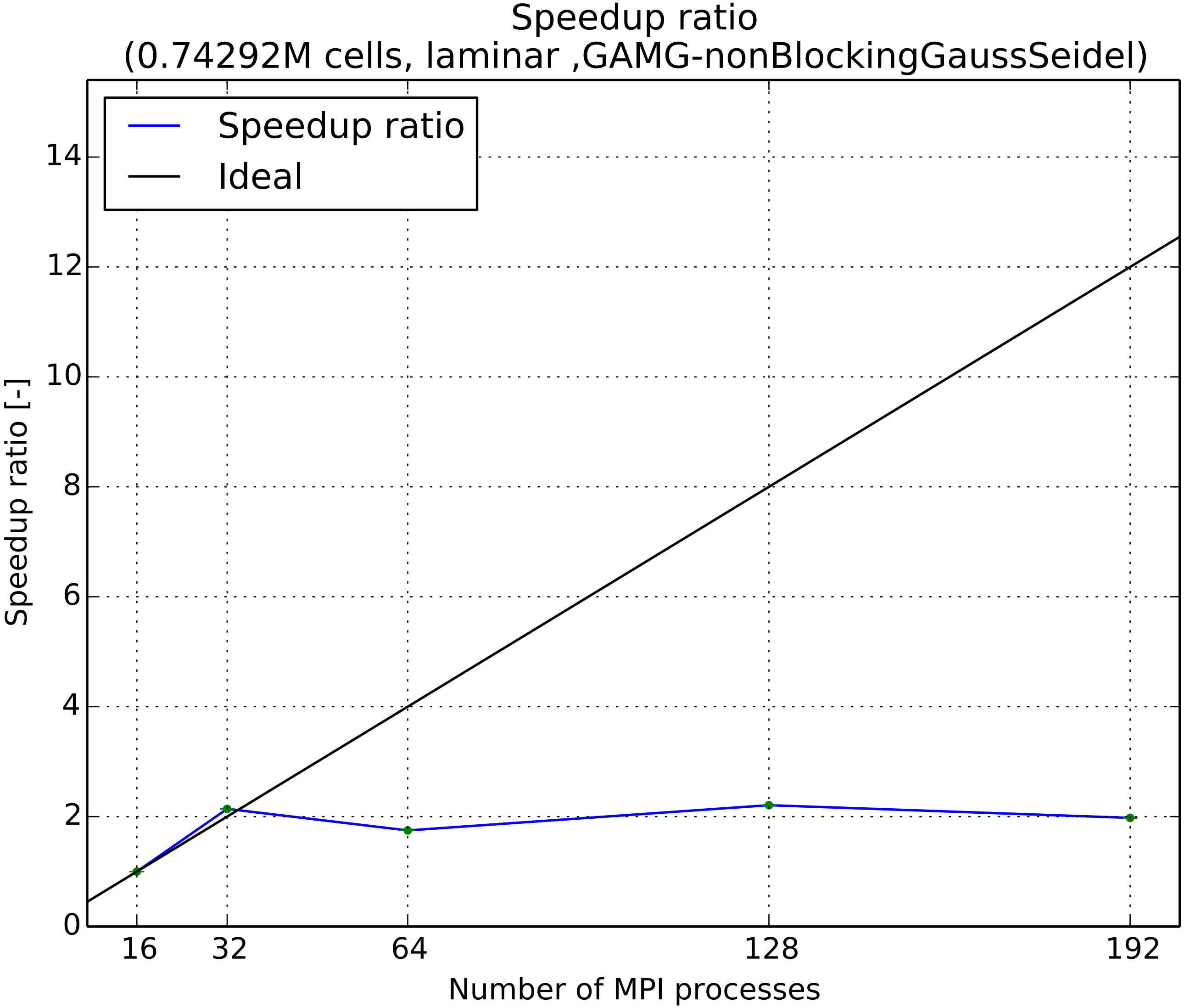
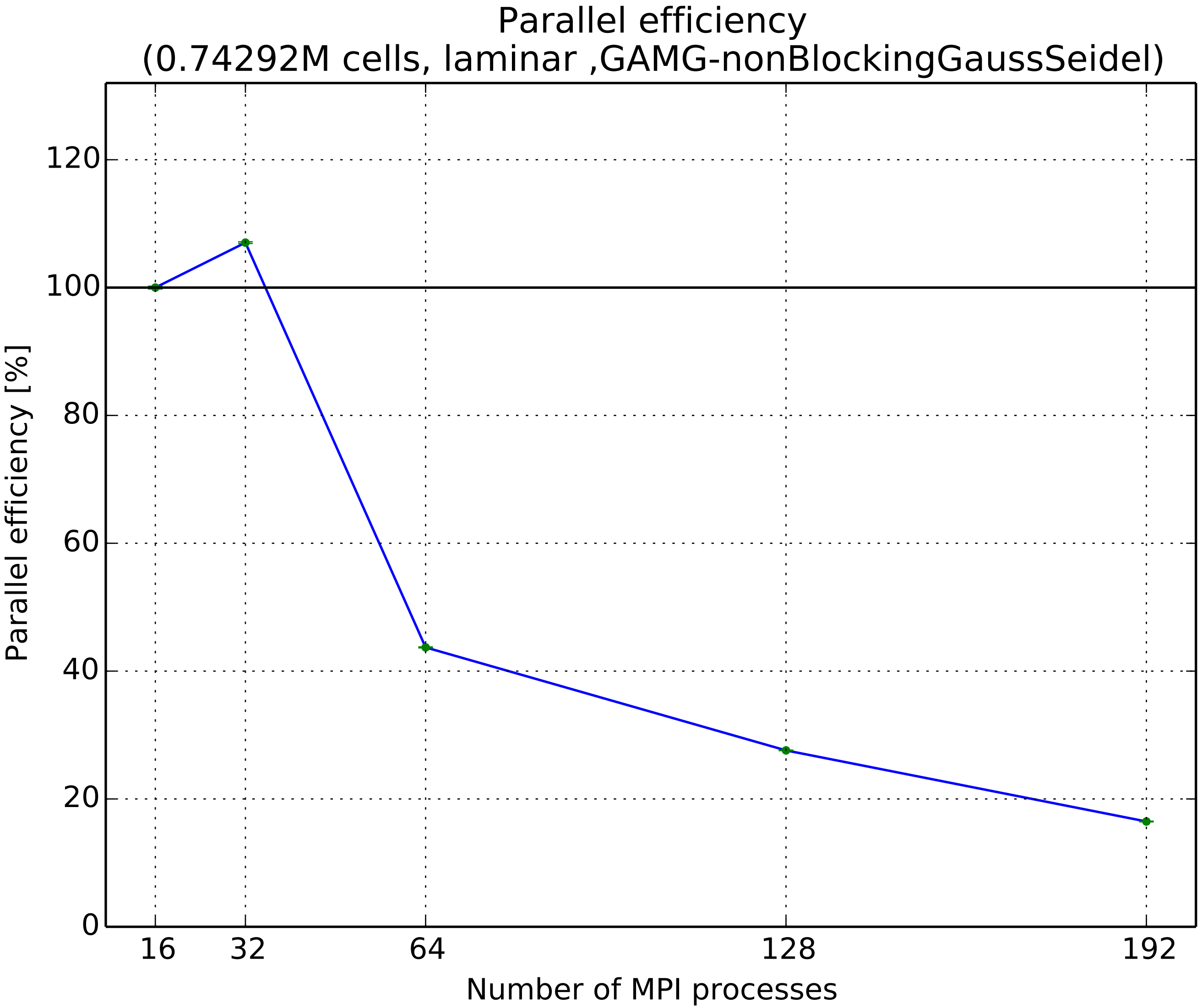
14
16
32
64
128
192
Number of MPI processes

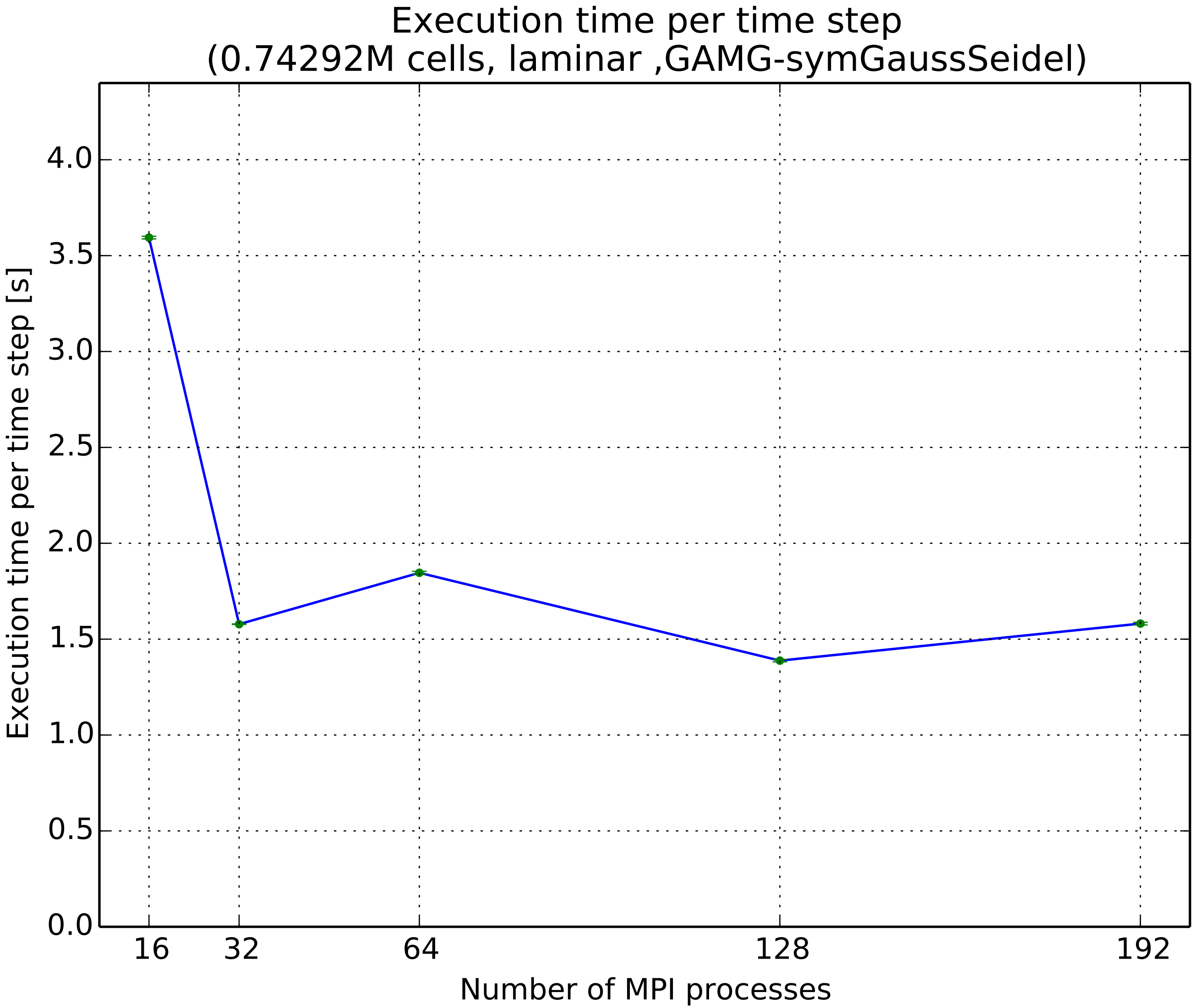

Parallel efficiency
(0.74292M cells, laminar ,GAMG-GaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes

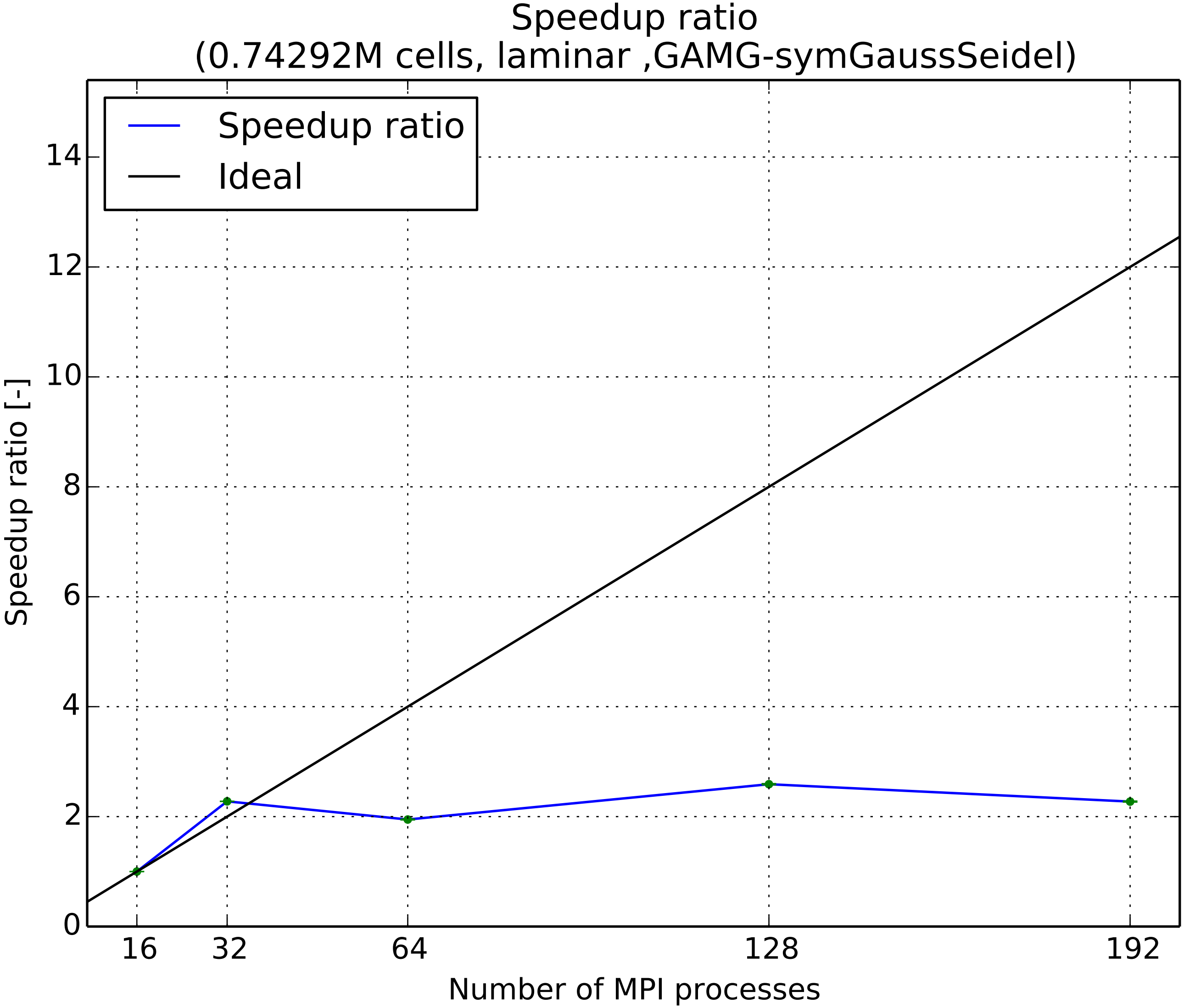


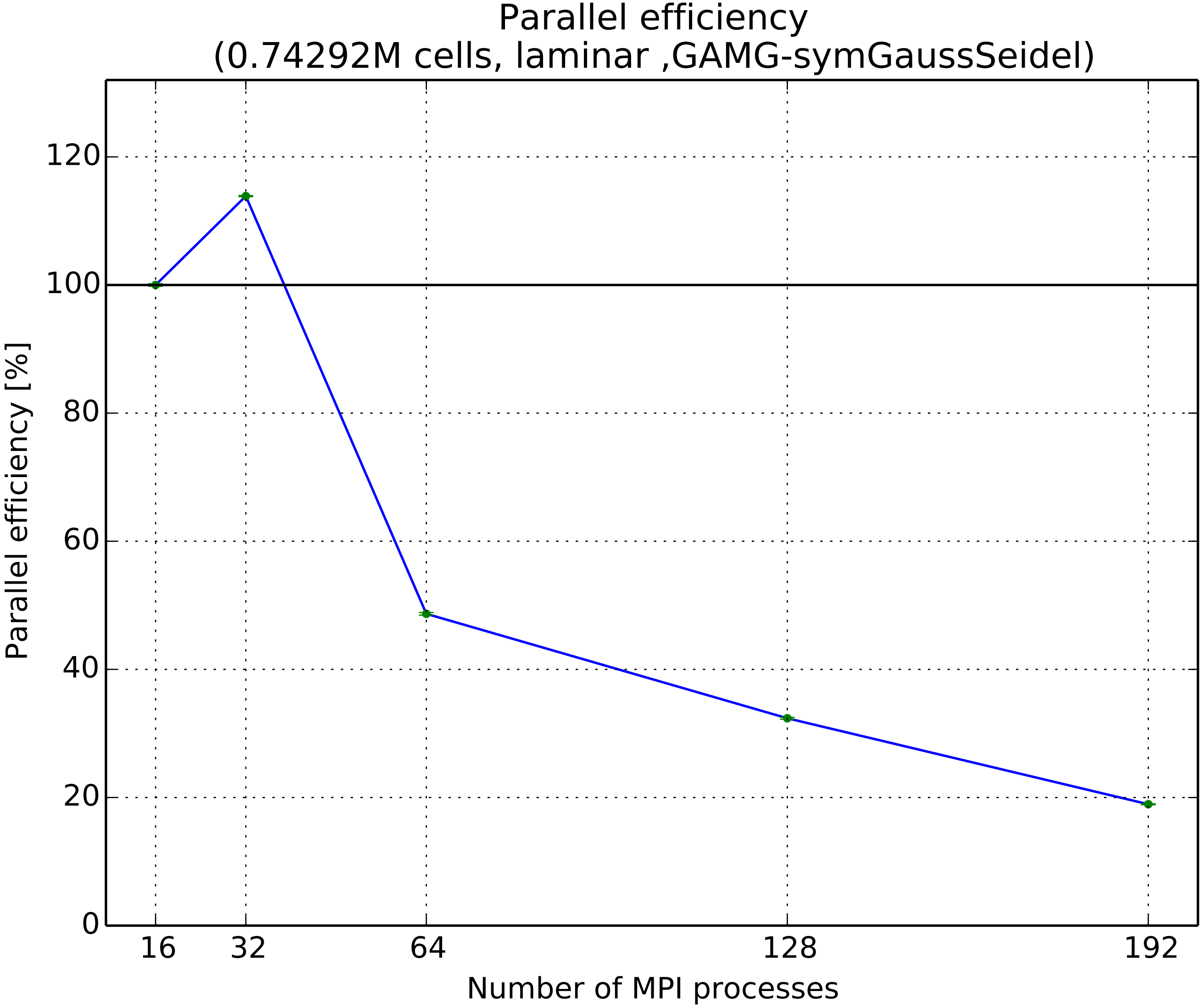
Execution time per time step
(0.74292M cells, laminar ,GAMG-nonBlockingGaussSeidel)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
16
32
64
128
192
Number of MPI processes

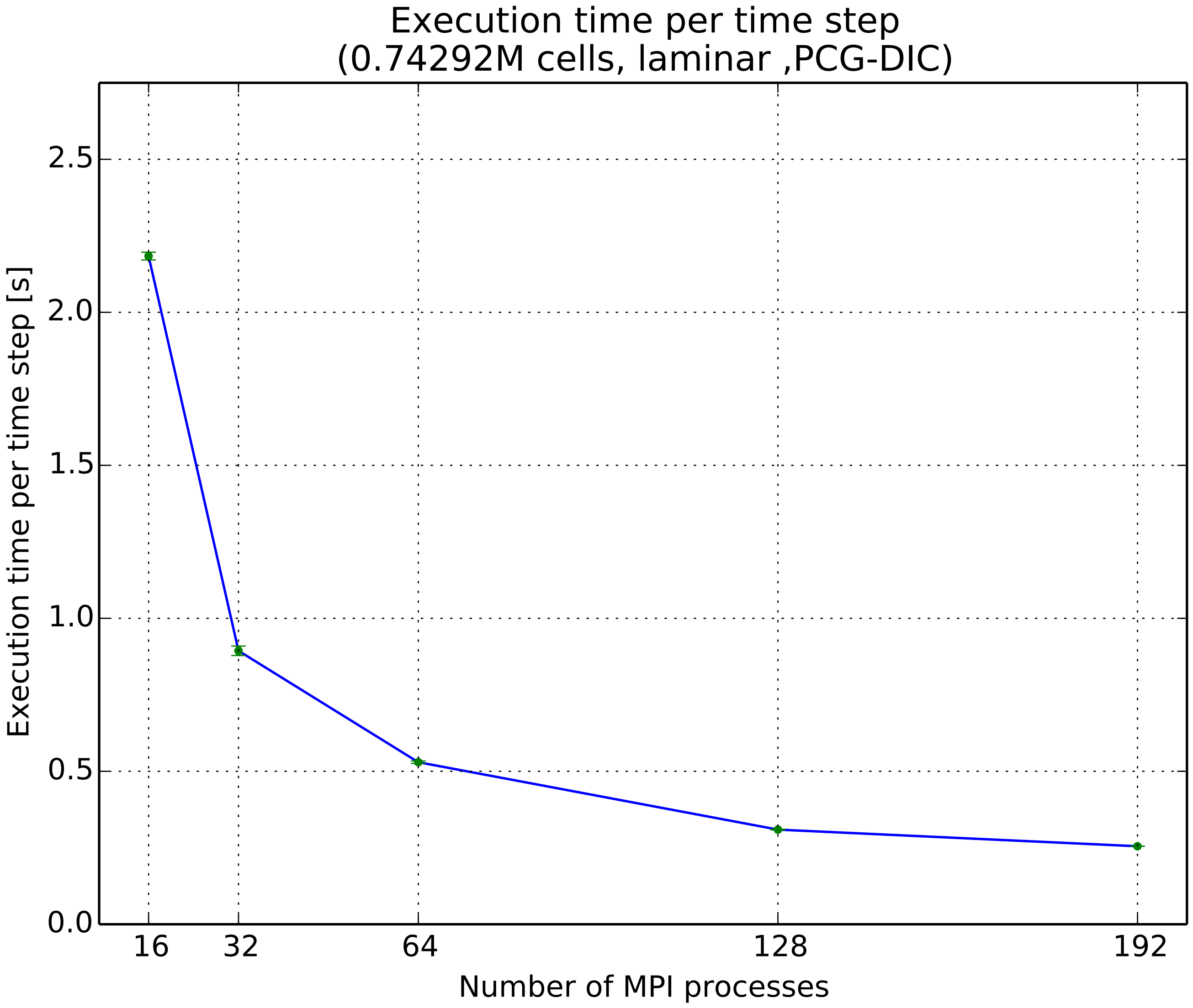

Speedup ratio
(0.74292M cells, laminar ,GAMG-nonBlockingGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

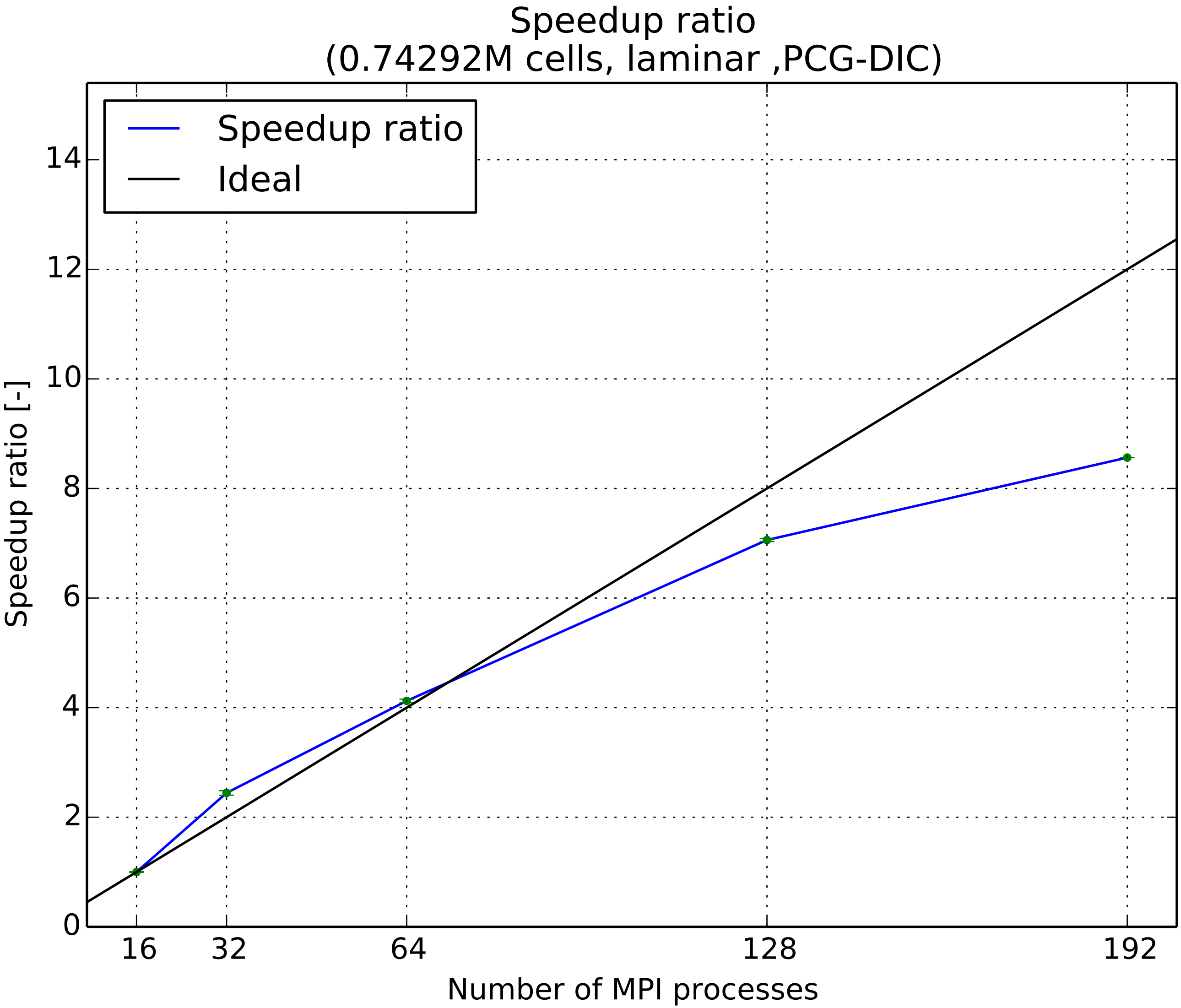

Parallel efficiency
(0.74292M cells, laminar ,GAMG-nonBlockingGaussSeidel)
Parallel efficiency [%]
Number of MPI processes
0
20
40
60
80
100
120
16
32
64
128
192

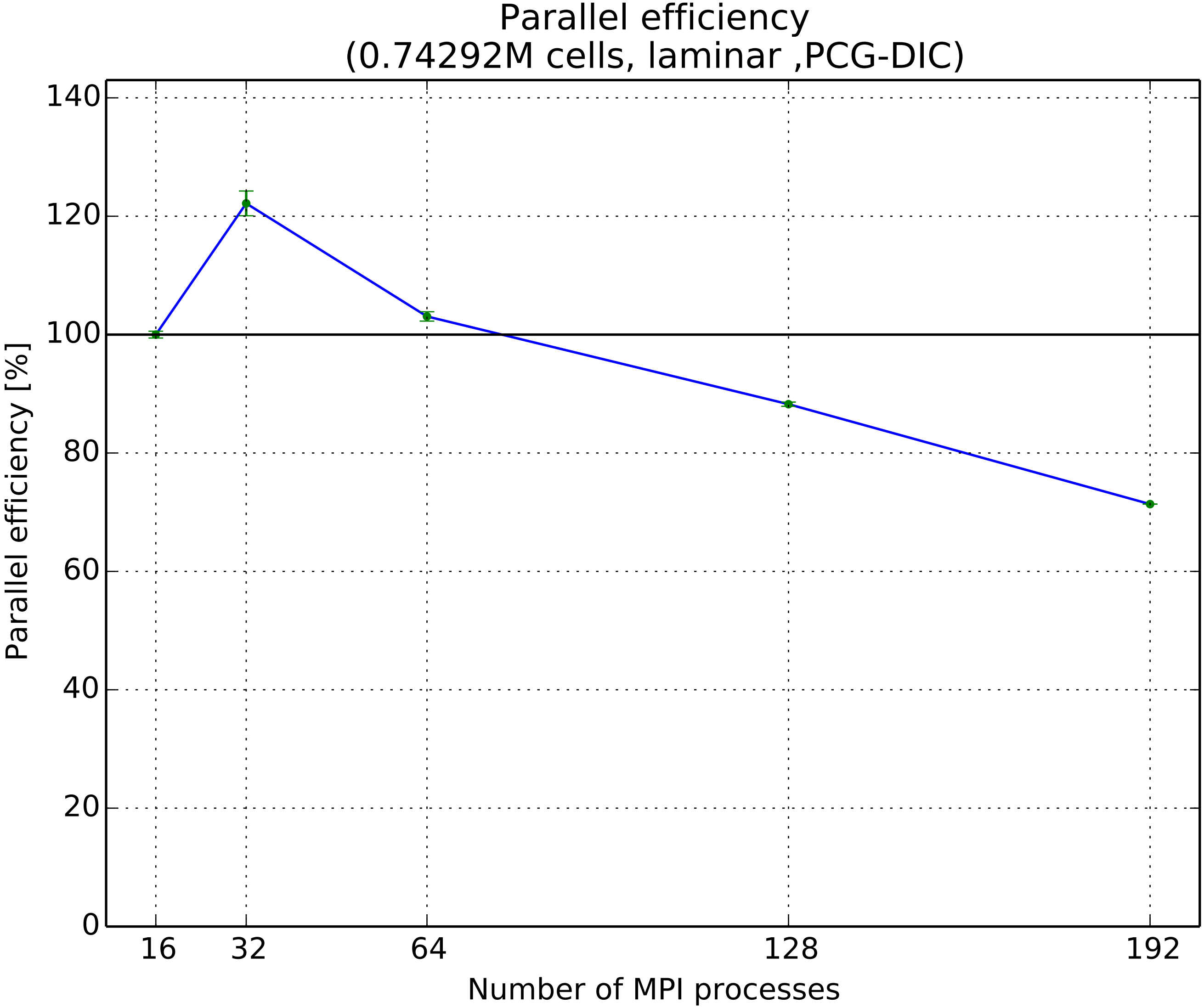

Execution time per time step
(0.74292M cells, laminar ,GAMG-symGaussSeidel)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
16
32
64
128
192
Number of MPI processes

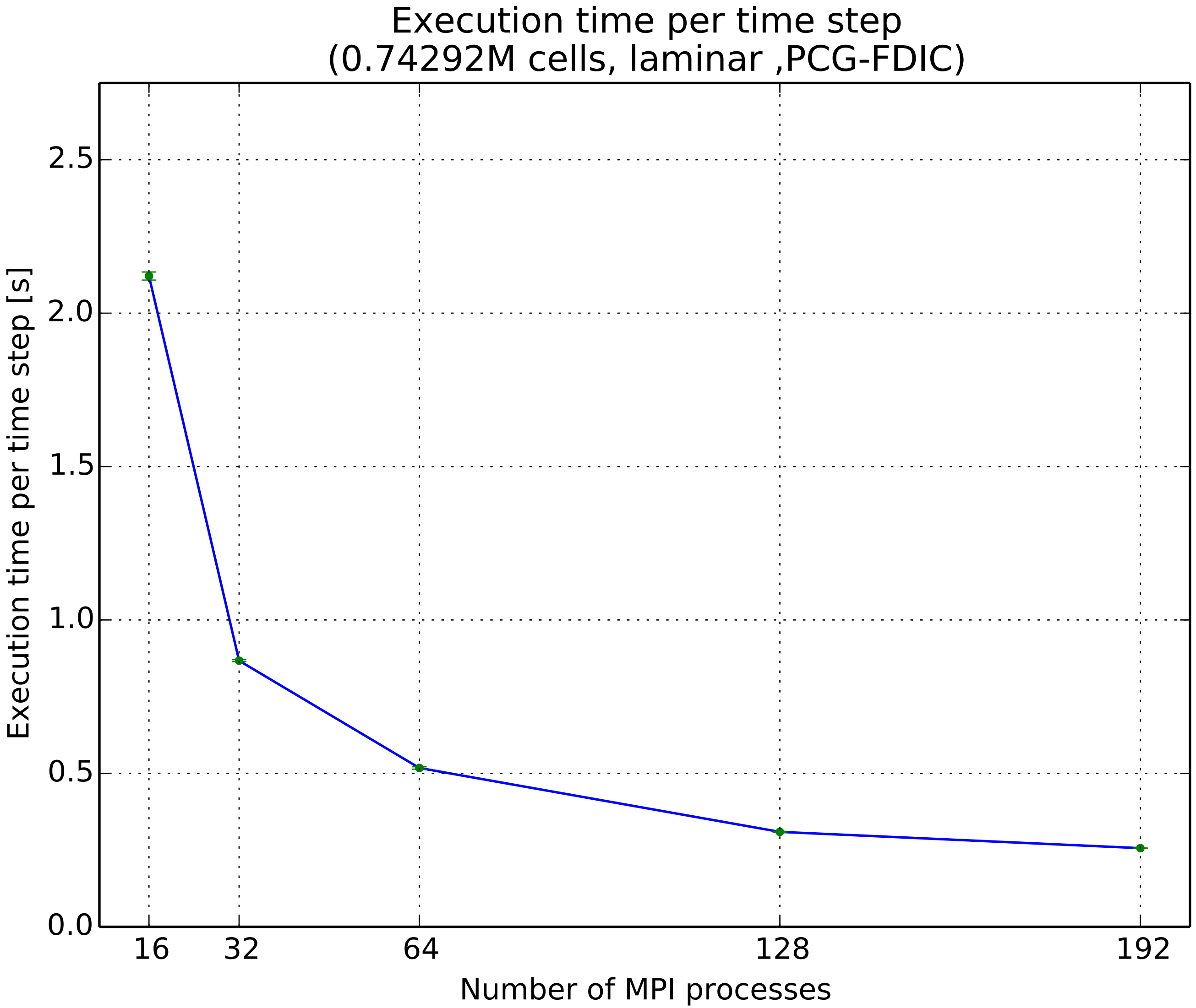

Speedup ratio
(0.74292M cells, laminar ,GAMG-symGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

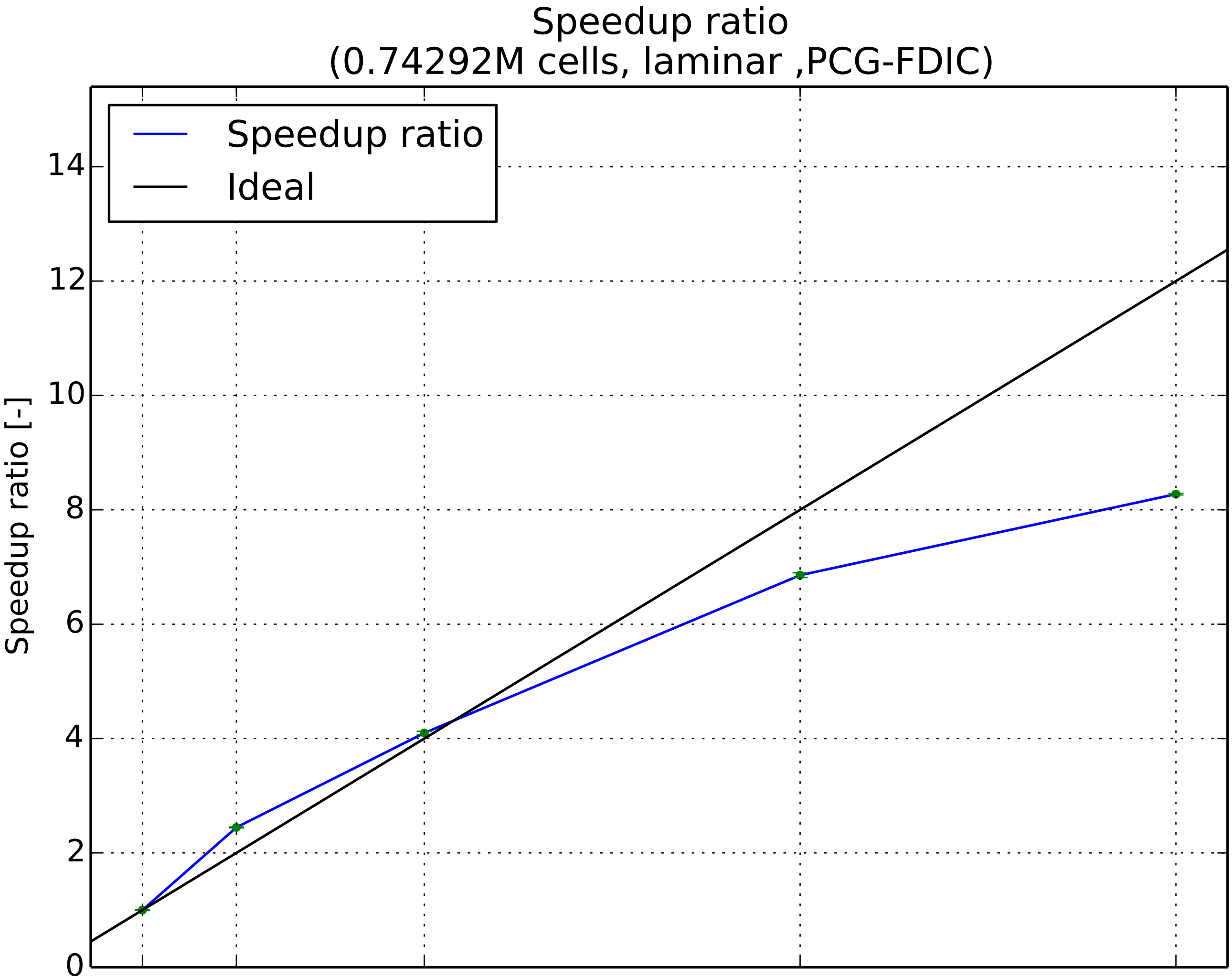

Parallel efficiency
(0.74292M cells, laminar ,GAMG-symGaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
Number of MPI processes
16
32
64
128
192

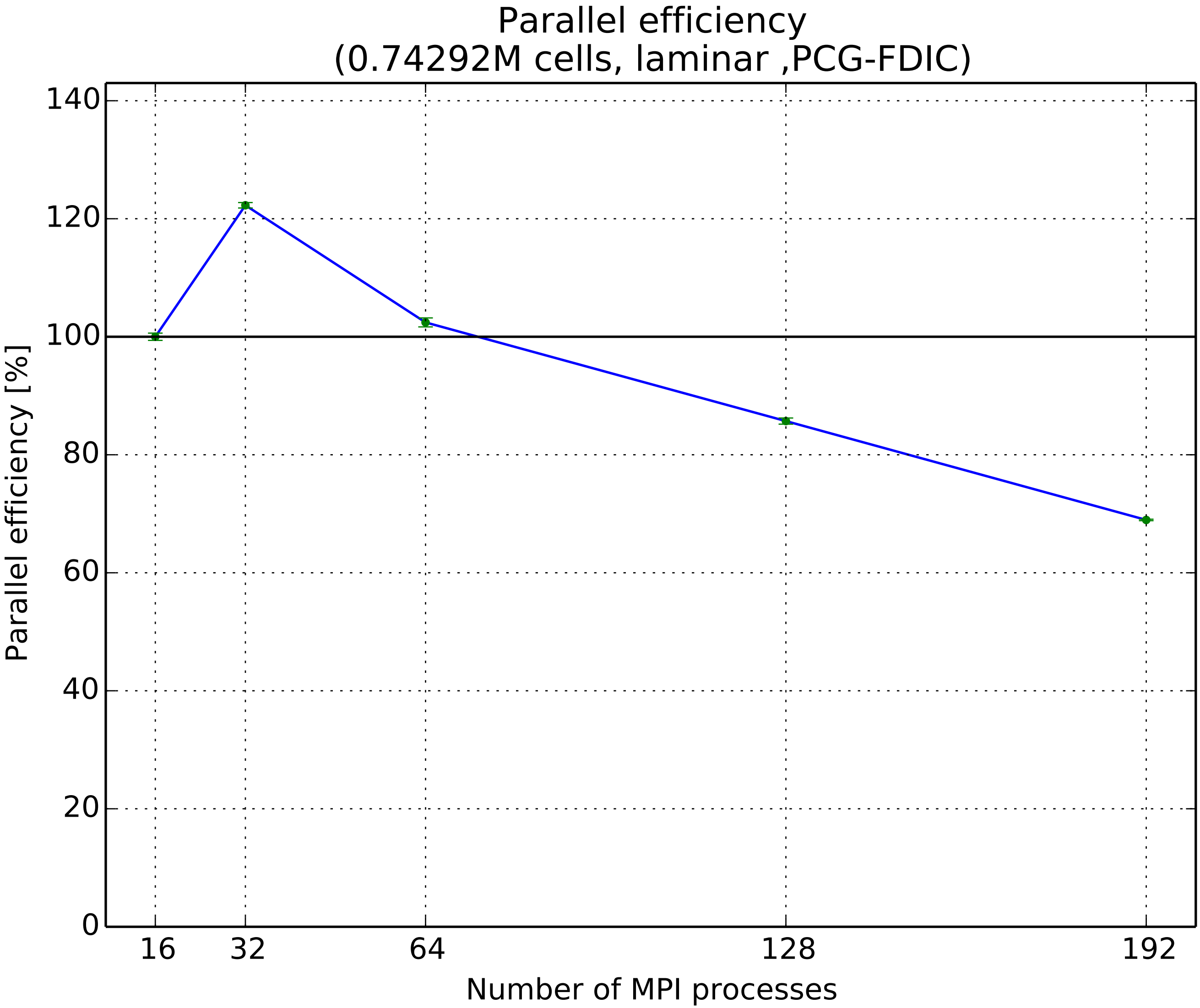

Execution time per time step
(0.74292M cells, laminar ,PCG-DIC)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
16
32
64
128
192
Number of MPI processes

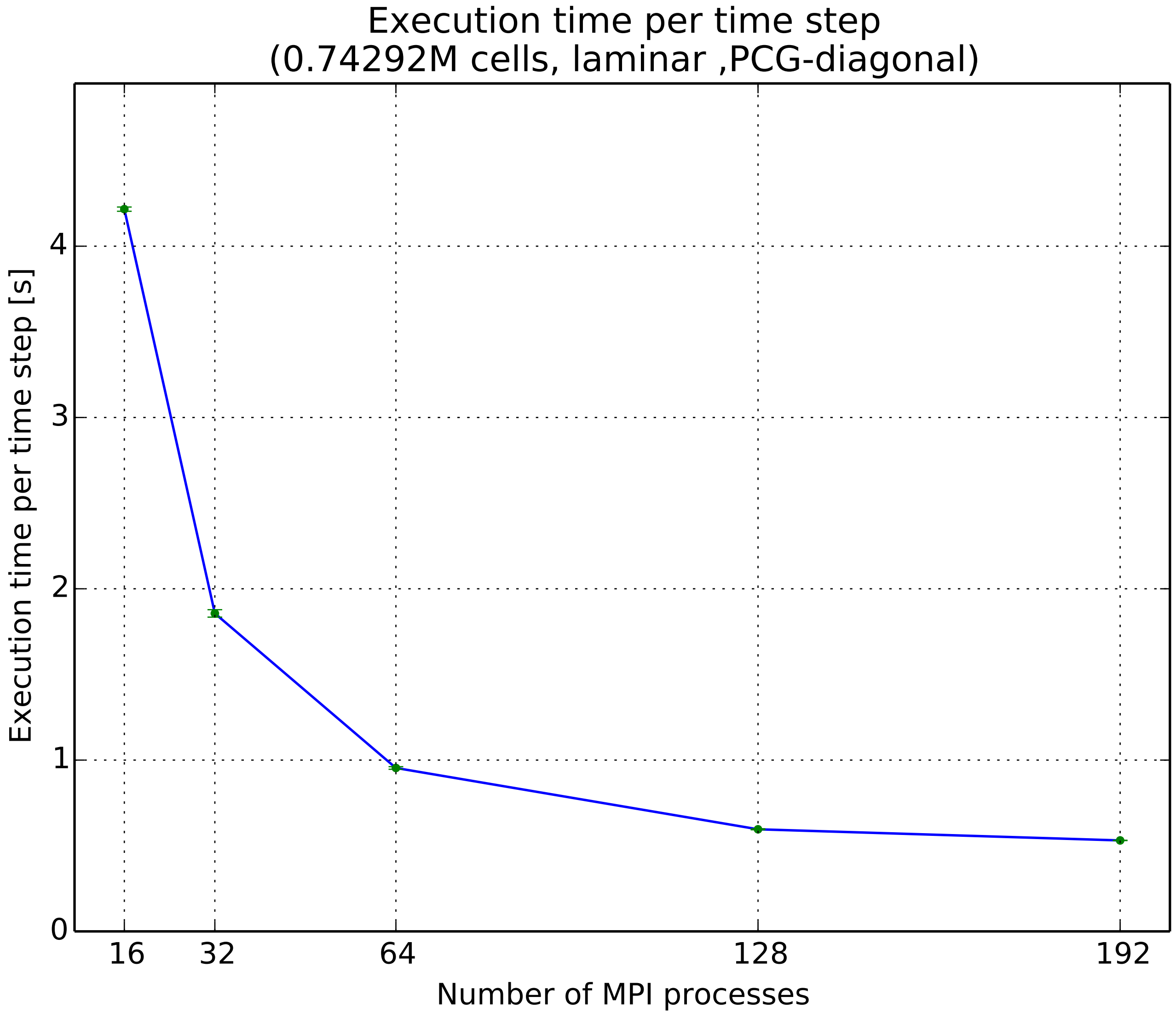

Speedup ratio
(0.74292M cells, laminar ,PCG-DIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

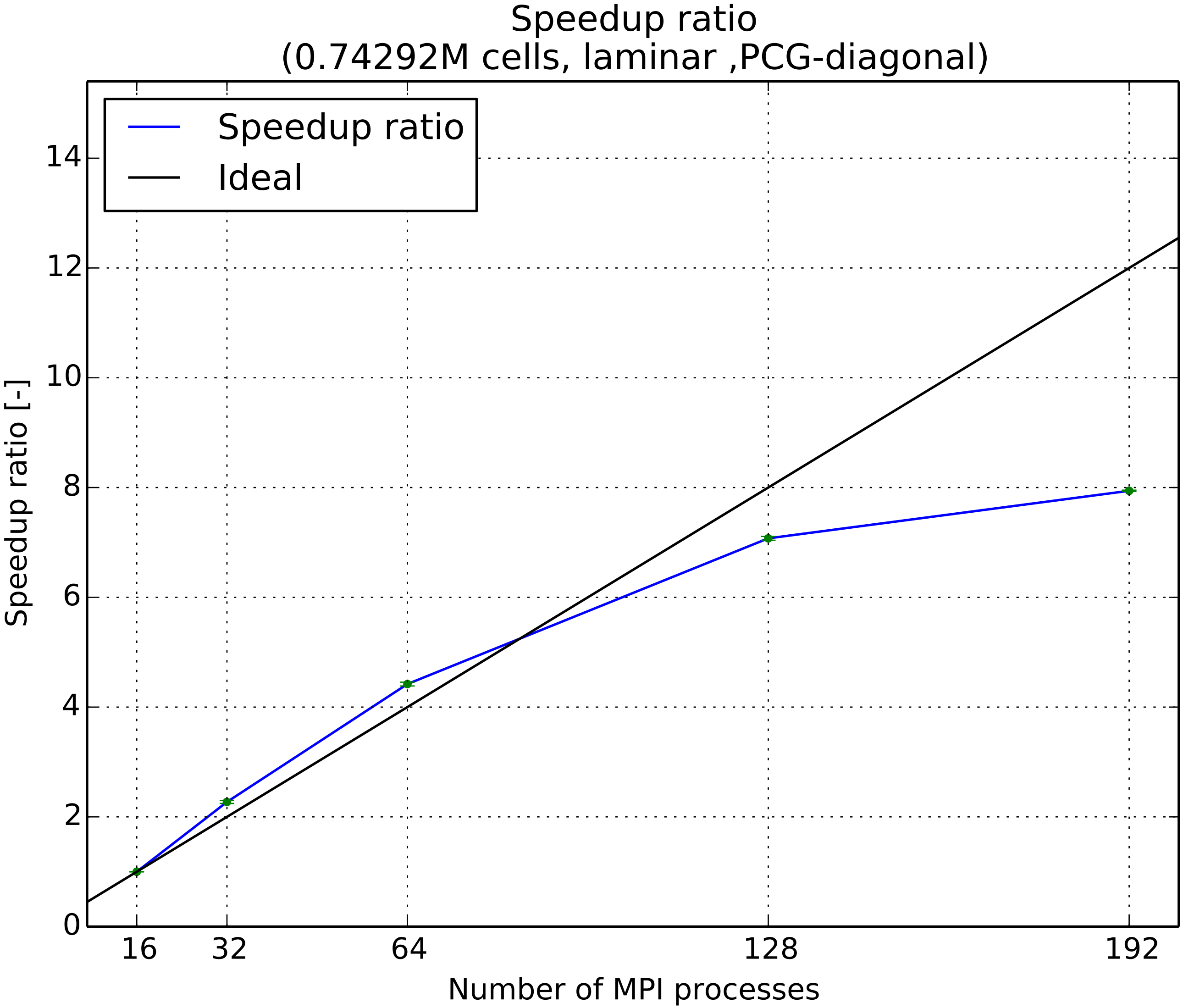

Parallel efficiency
(0.74292M cells, laminar ,PCG-DIC)
Parallel efficiency [%]
0
20
40
60
80
100
120
140
16
32
64
128
192
Number of MPI processes

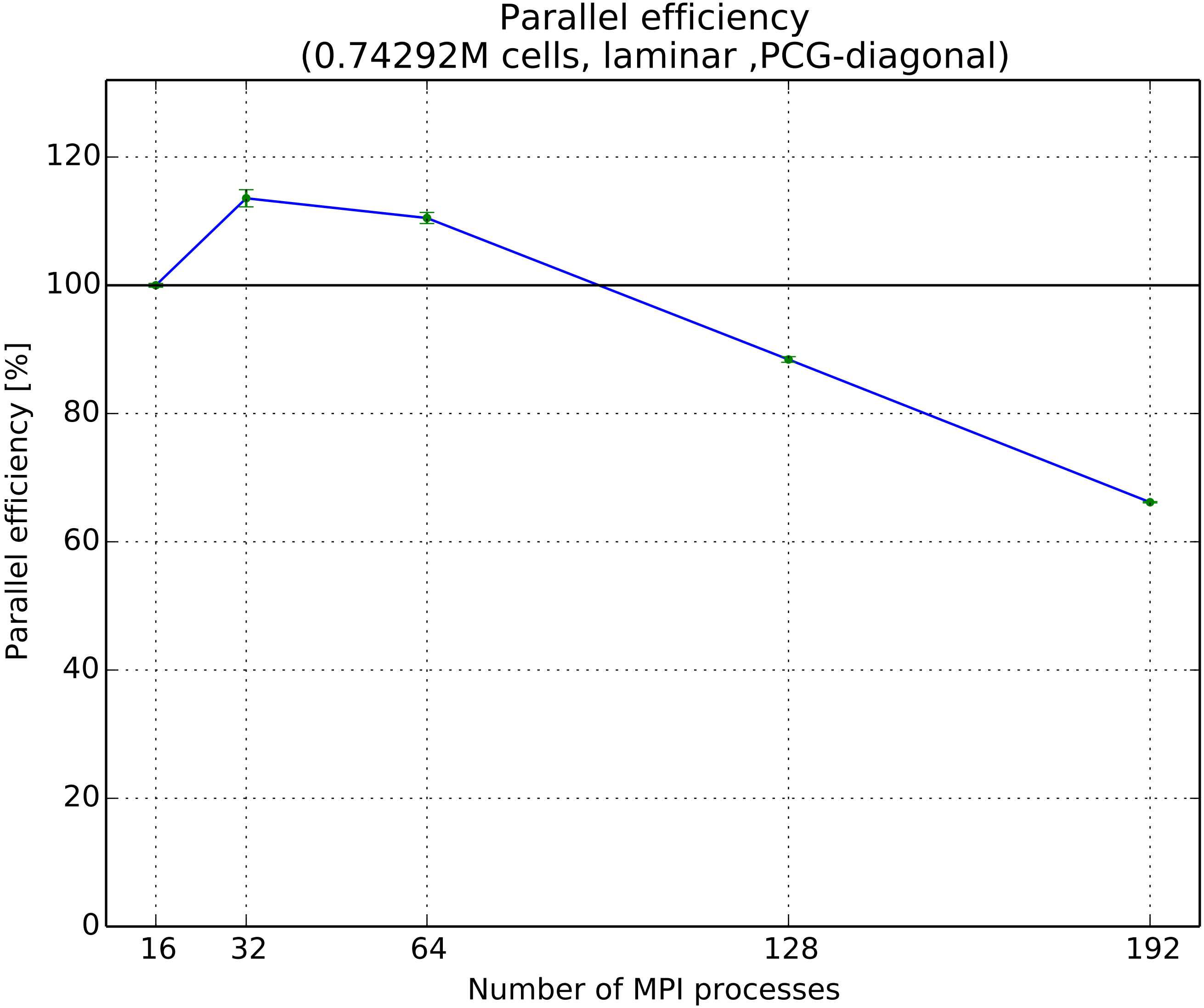

Execution time per time step
(0.74292M cells, laminar ,PCG-FDIC)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
16
32
64
128
192
Number of MPI processes

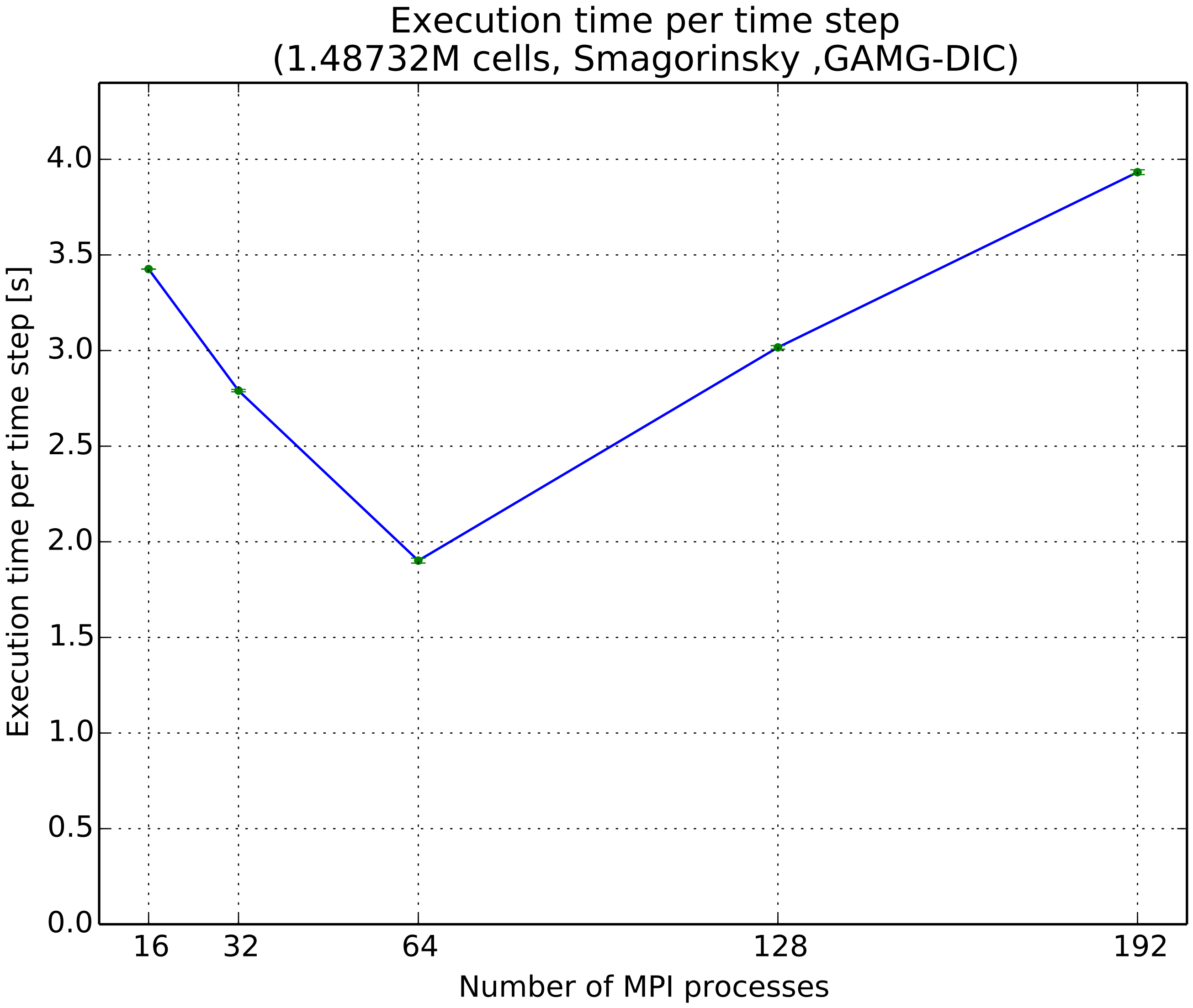

Speedup ratio
(0.74292M cells, laminar ,PCG-FDIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

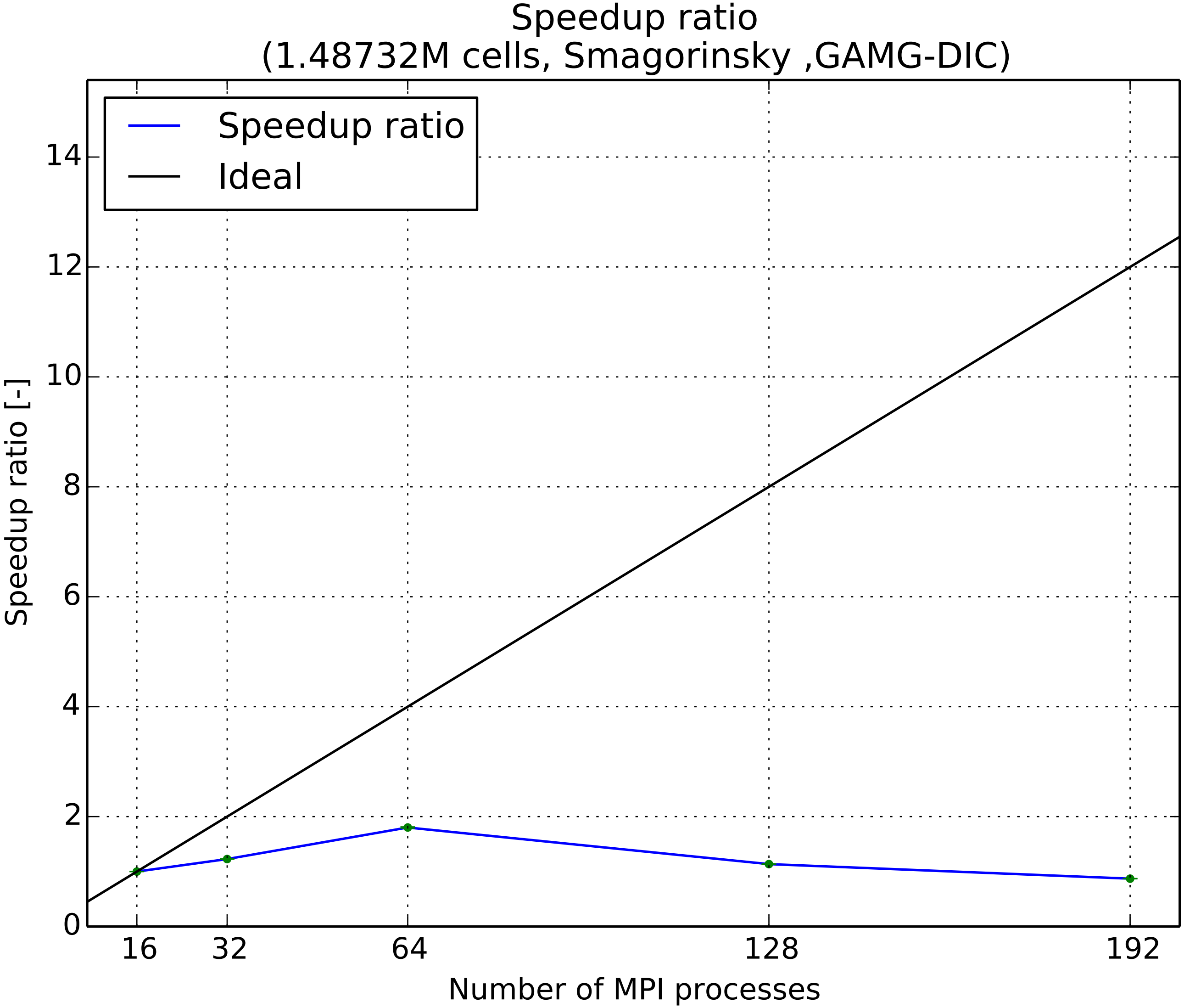
Parallel efficiency
(0.74292M cells, laminar ,PCG-FDIC)
Parallel efficiency [%]
0
20
40
60
80
100
120
140
16
32
64
128
192
Number of MPI processes

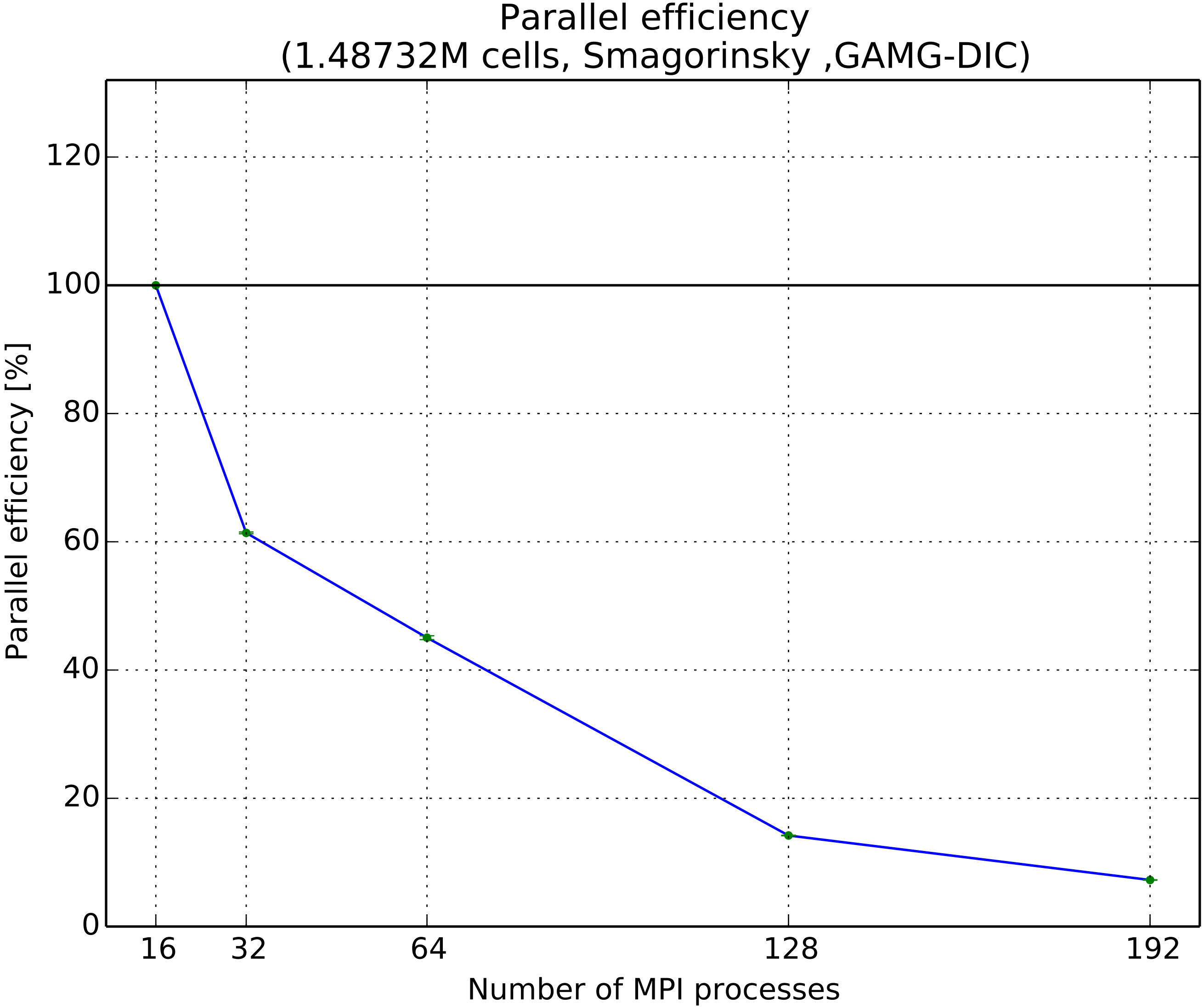

Execution time per time step
(0.74292M cells, laminar ,PCG-diagonal)
Execution time per time step [s]
0
1
2
3
4
16
32
64
128
192
Number of MPI processes

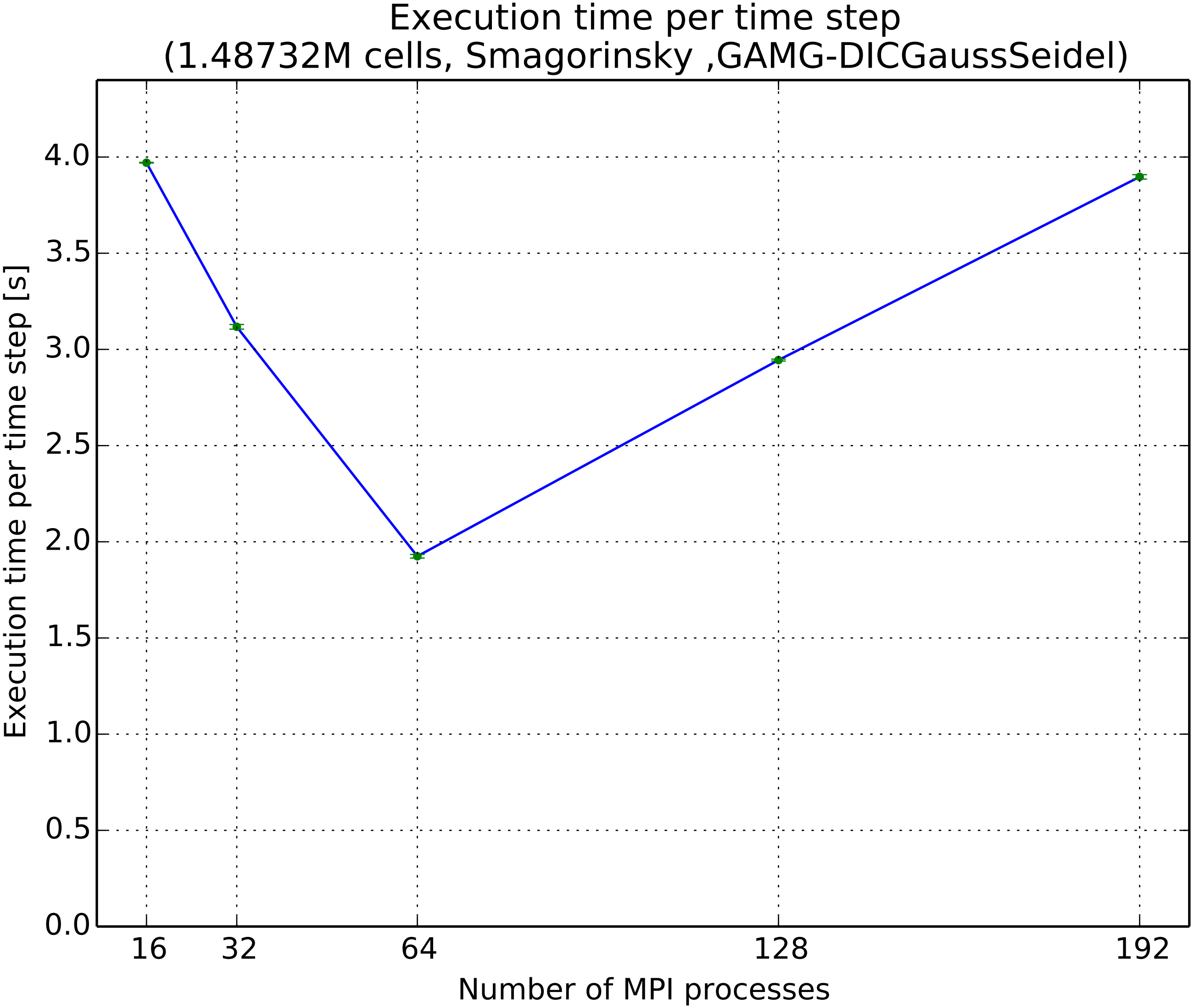

Speedup ratio
(0.74292M cells, laminar ,PCG-diagonal)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

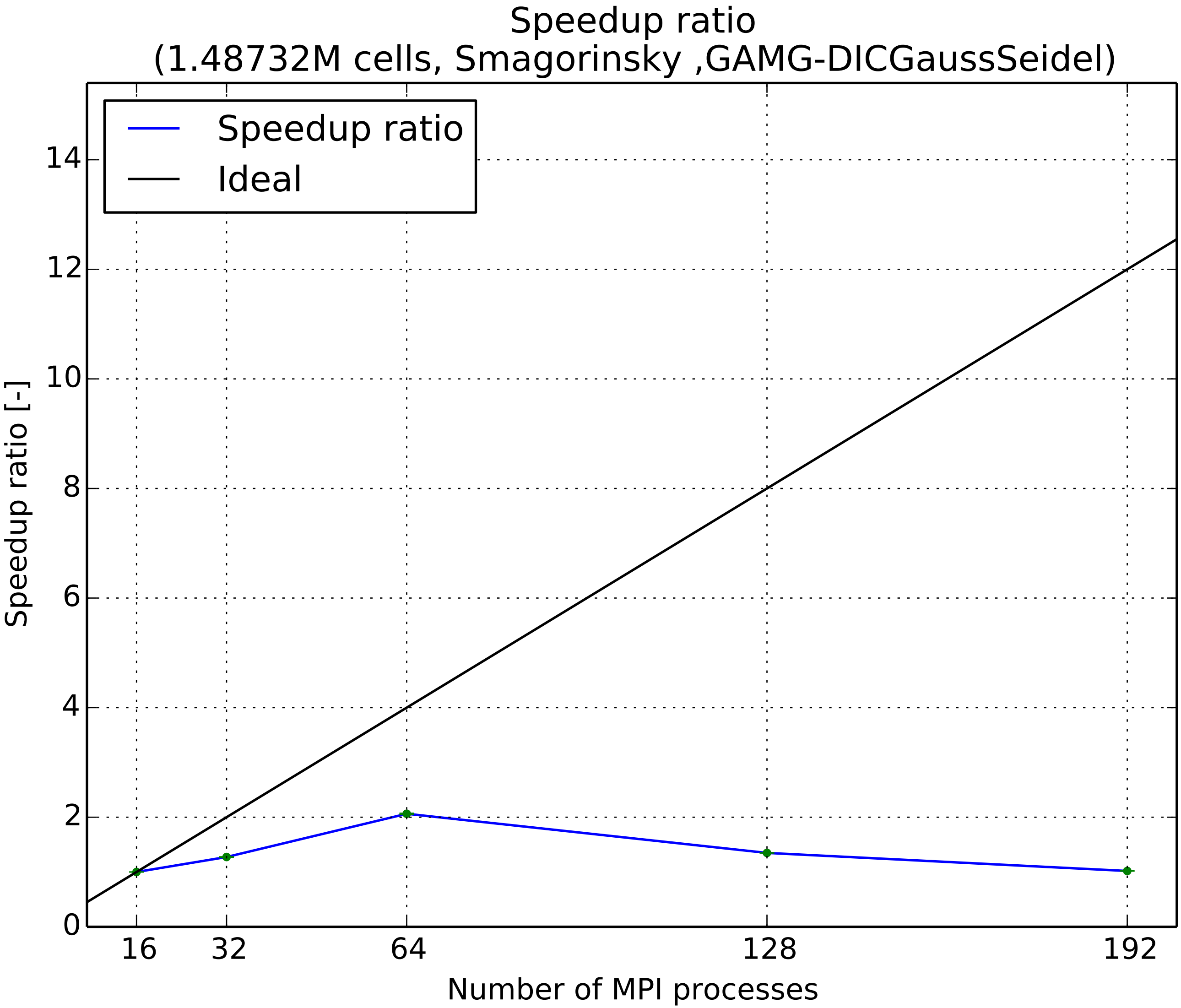

Parallel efficiency
(0.74292M cells, laminar ,PCG-diagonal)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes


Execution time per time step
(1.48732M cells, Smagorinsky ,GAMG-DIC)
Execution time per time step [s]
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
16
32
64
128
192
Number of MPI processes


Speedup ratio
(1.48732M cells, Smagorinsky ,GAMG-DIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes


Parallel efficiency
(1.48732M cells, Smagorinsky ,GAMG-DIC)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes


Execution time per time step
(1.48732M cells, Smagorinsky ,GAMG-DICGaussSeidel)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
16
32
64
128
192
Number of MPI processes


Speedup ratio
(1.48732M cells, Smagorinsky ,GAMG-DICGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
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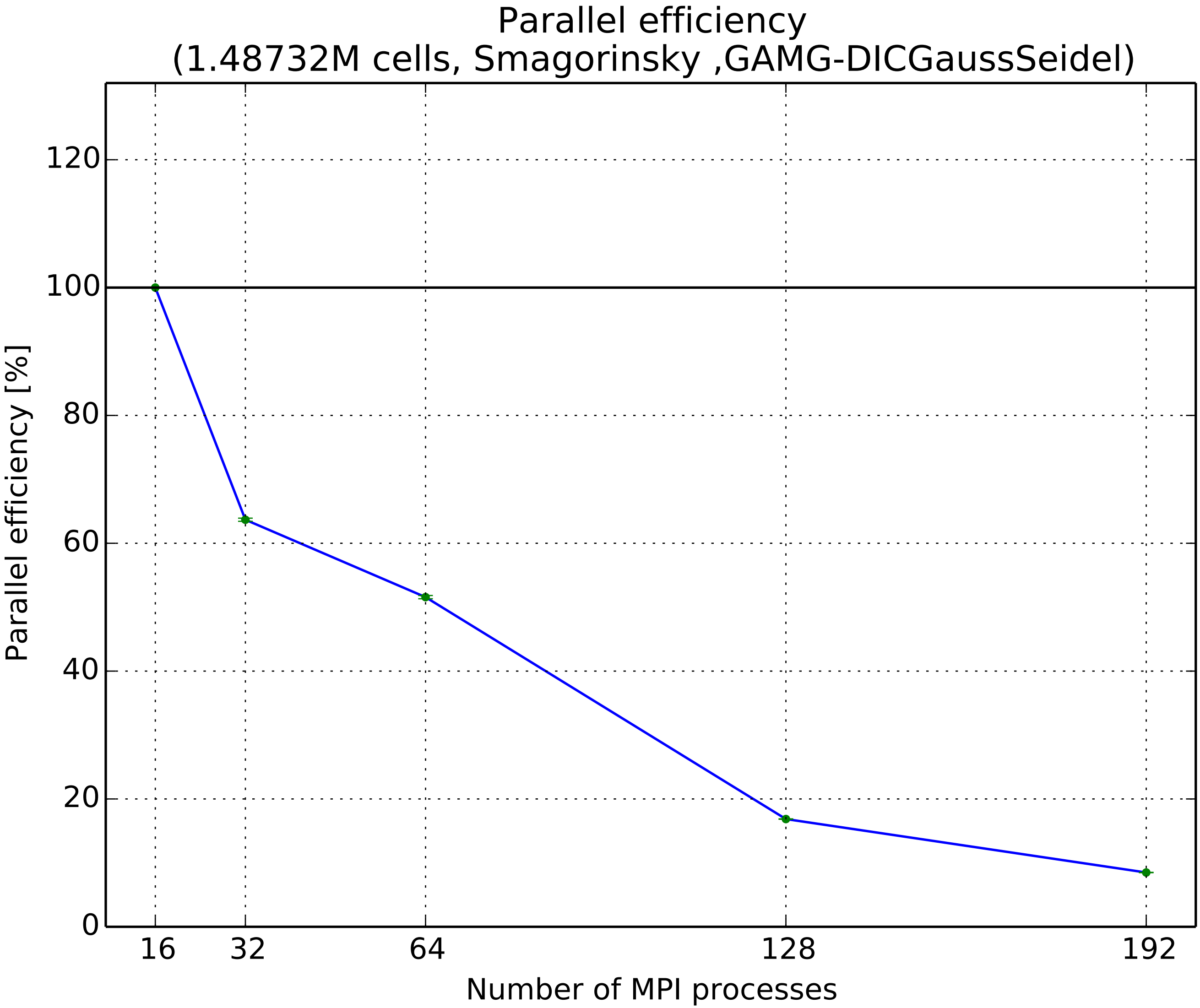
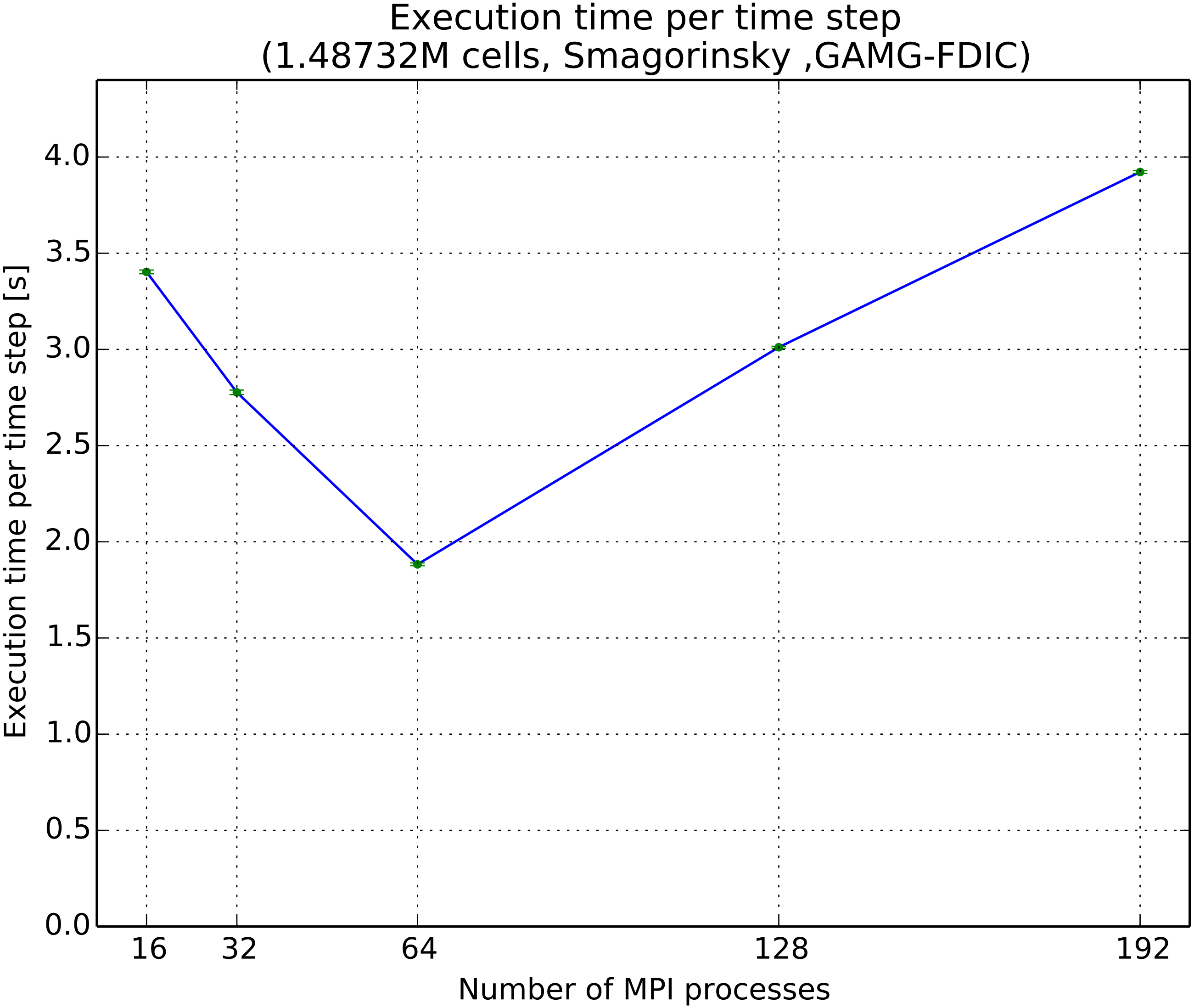
128
192
Number of MPI processes


Parallel efficiency
(1.48732M cells, Smagorinsky ,GAMG-DICGaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes


Execution time per time step
(1.48732M cells, Smagorinsky ,GAMG-FDIC)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
16
32
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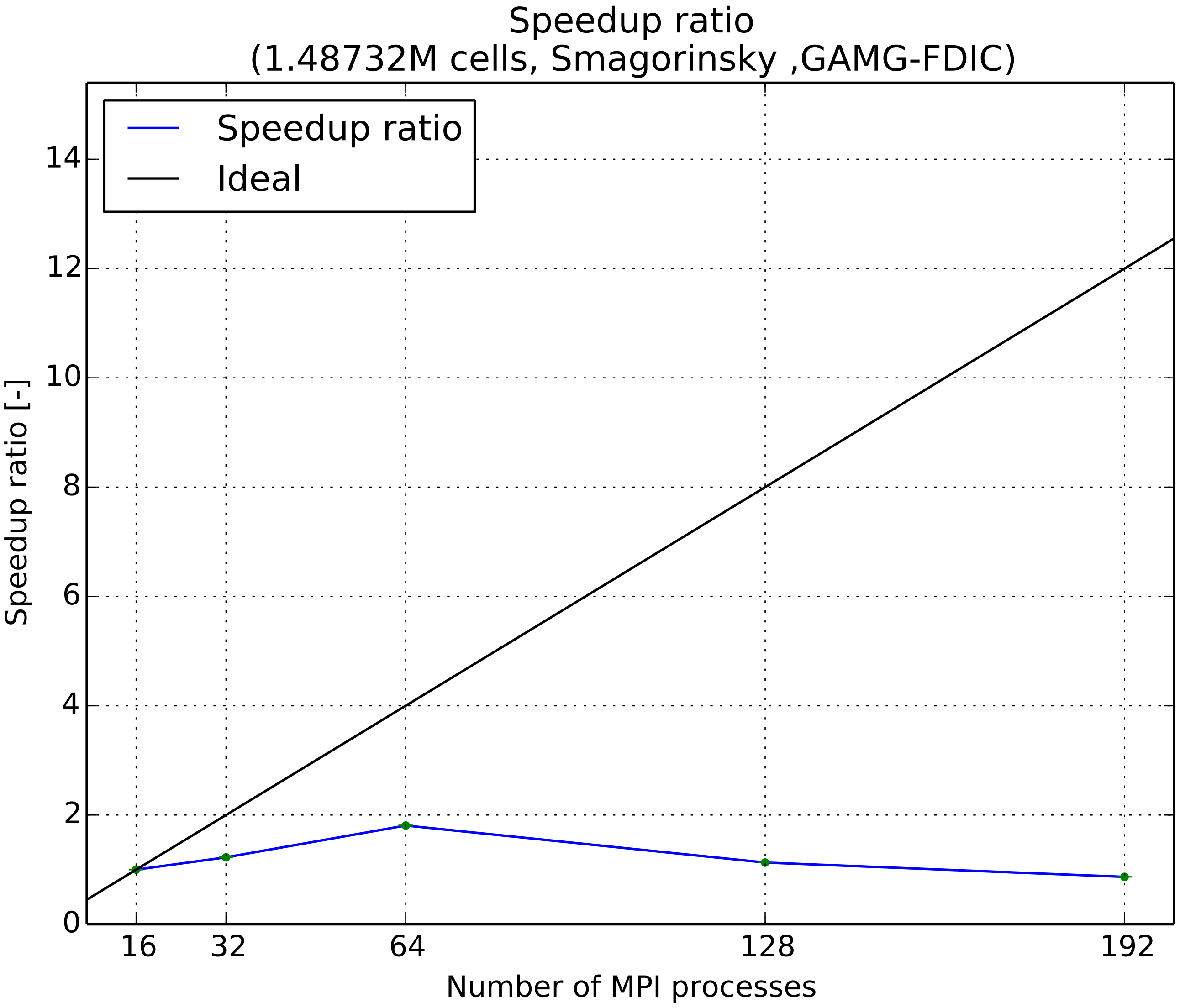
128
192
Number of MPI processes


Speedup ratio
(1.48732M cells, Smagorinsky ,GAMG-FDIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
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128
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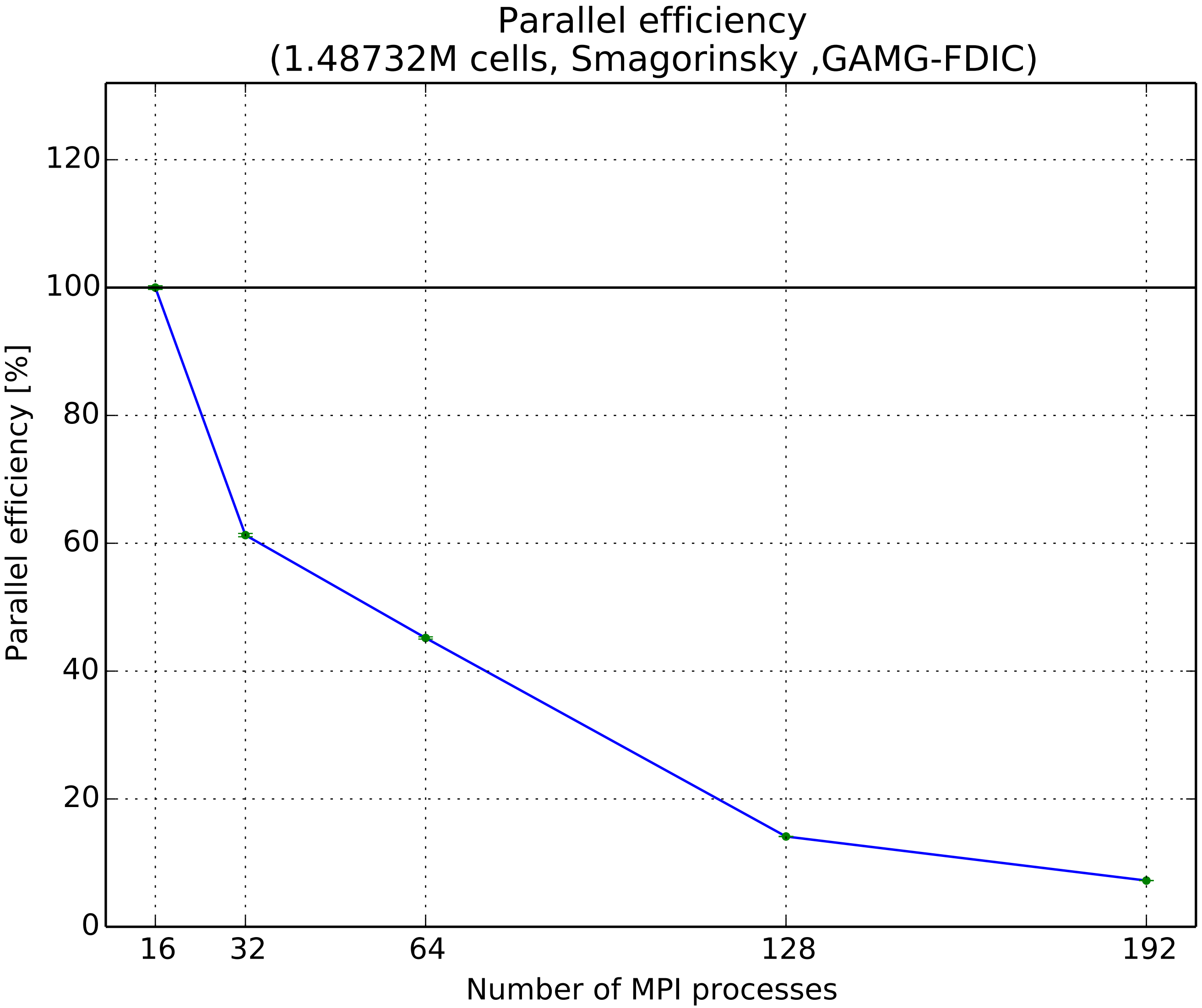
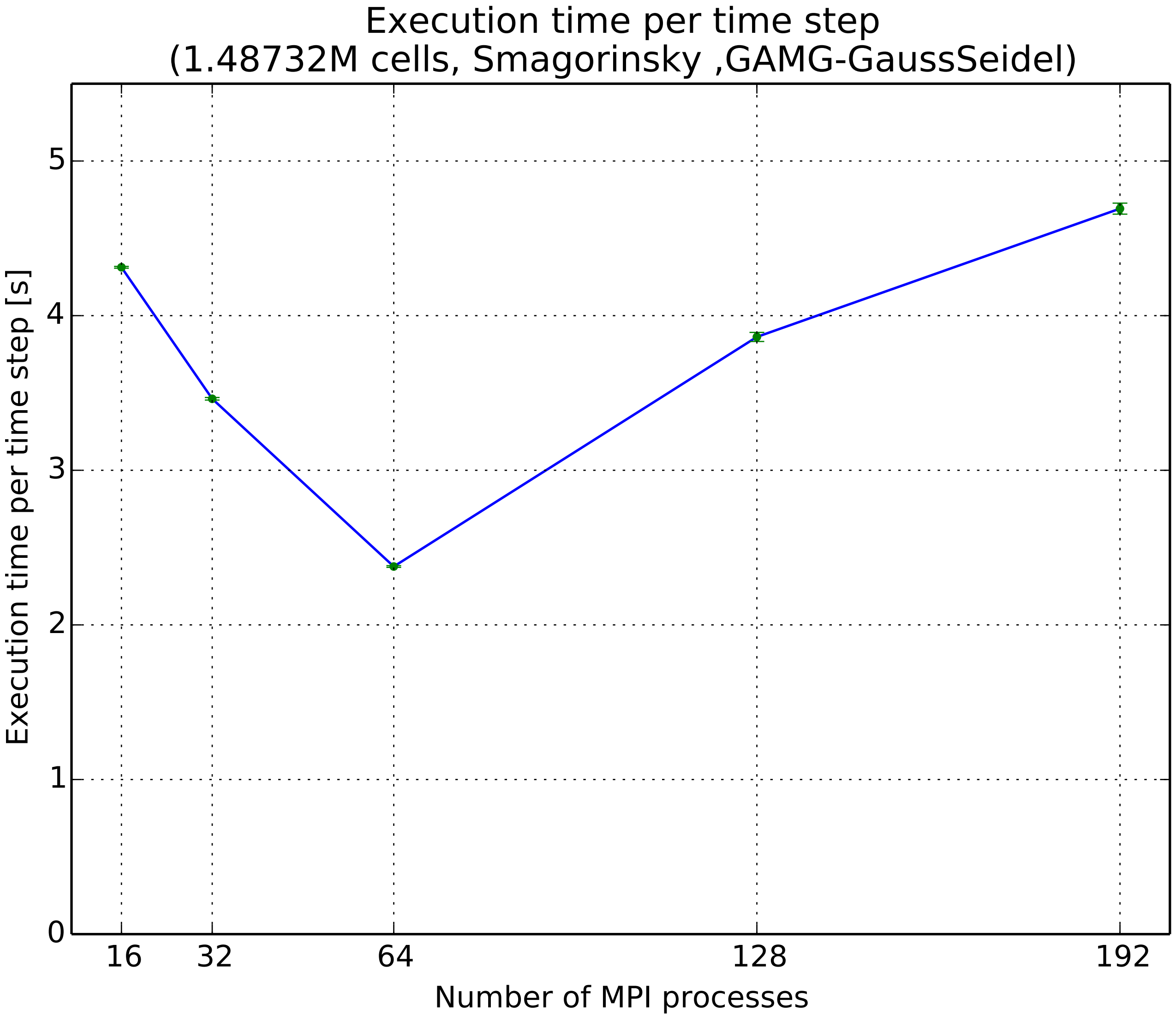
Number of MPI processes


Parallel efficiency
(1.48732M cells, Smagorinsky ,GAMG-FDIC)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes


Execution time per time step
(1.48732M cells, Smagorinsky ,GAMG-GaussSeidel)
Execution time per time step [s]
0
1
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5
16
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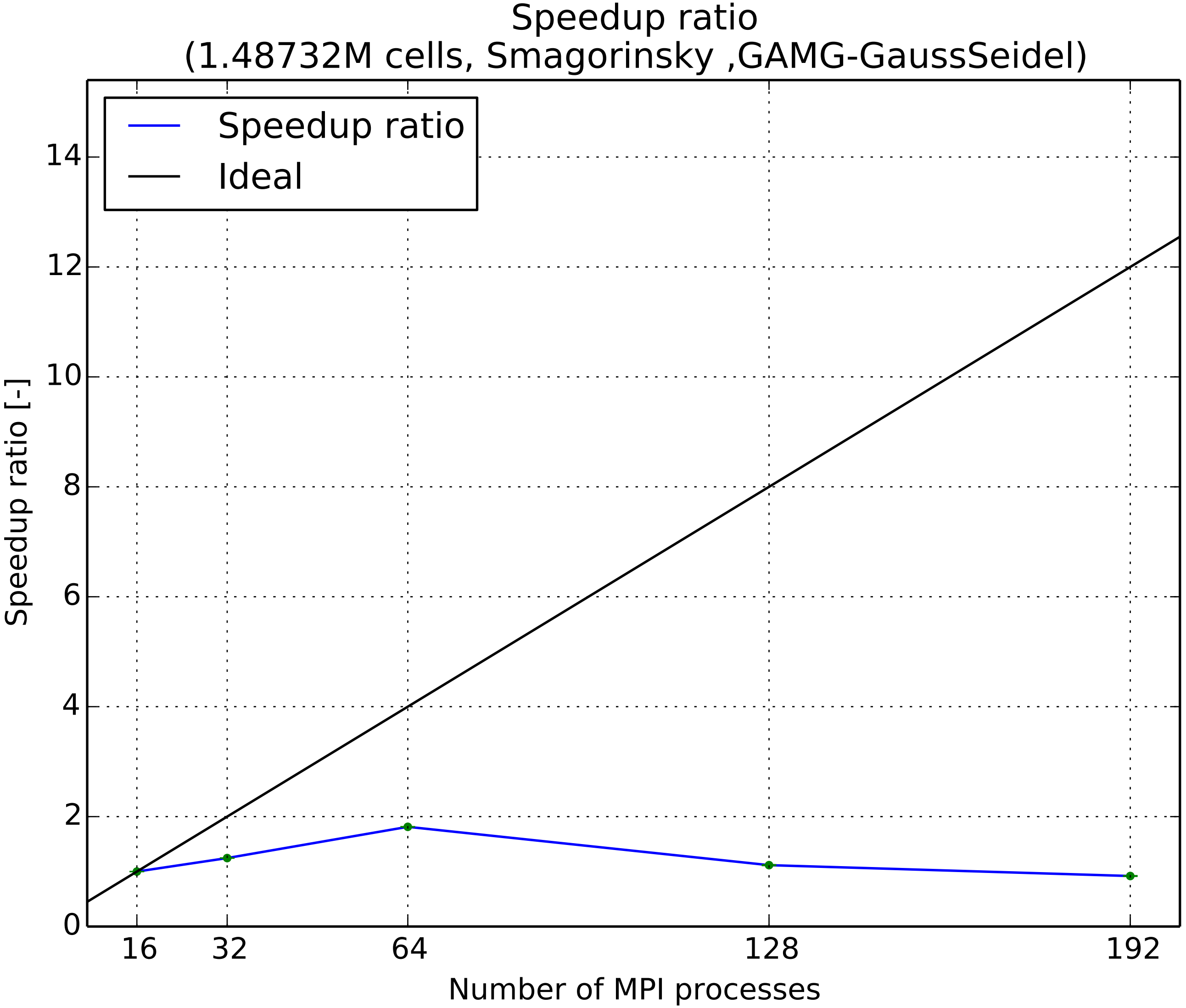
64
128
192
Number of MPI processes


Speedup ratio
(1.48732M cells, Smagorinsky ,GAMG-GaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
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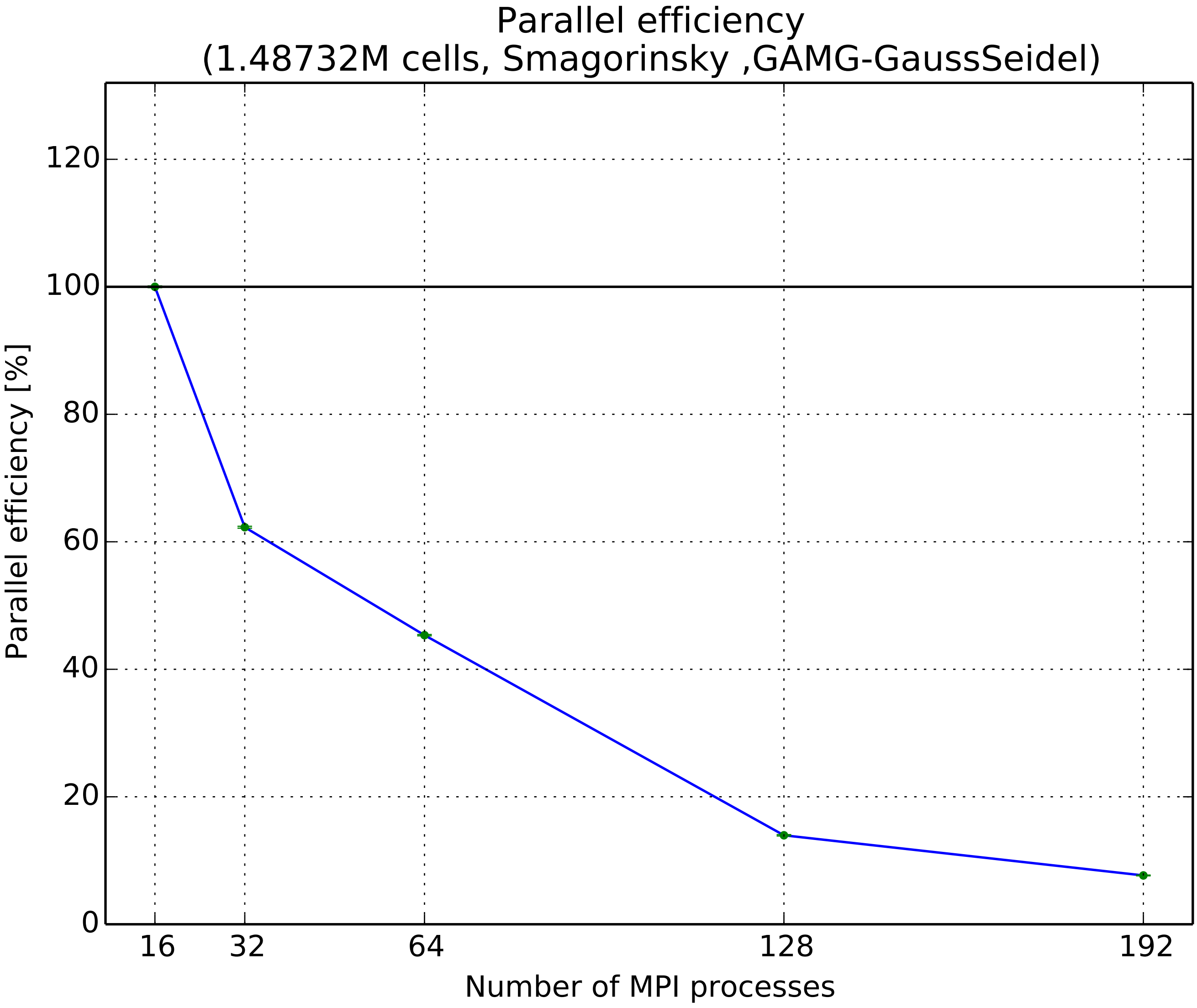
128
192
Number of MPI processes


Parallel efficiency
(1.48732M cells, Smagorinsky ,GAMG-GaussSeidel)
Parallel efficiency [%]
0
20
40
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120
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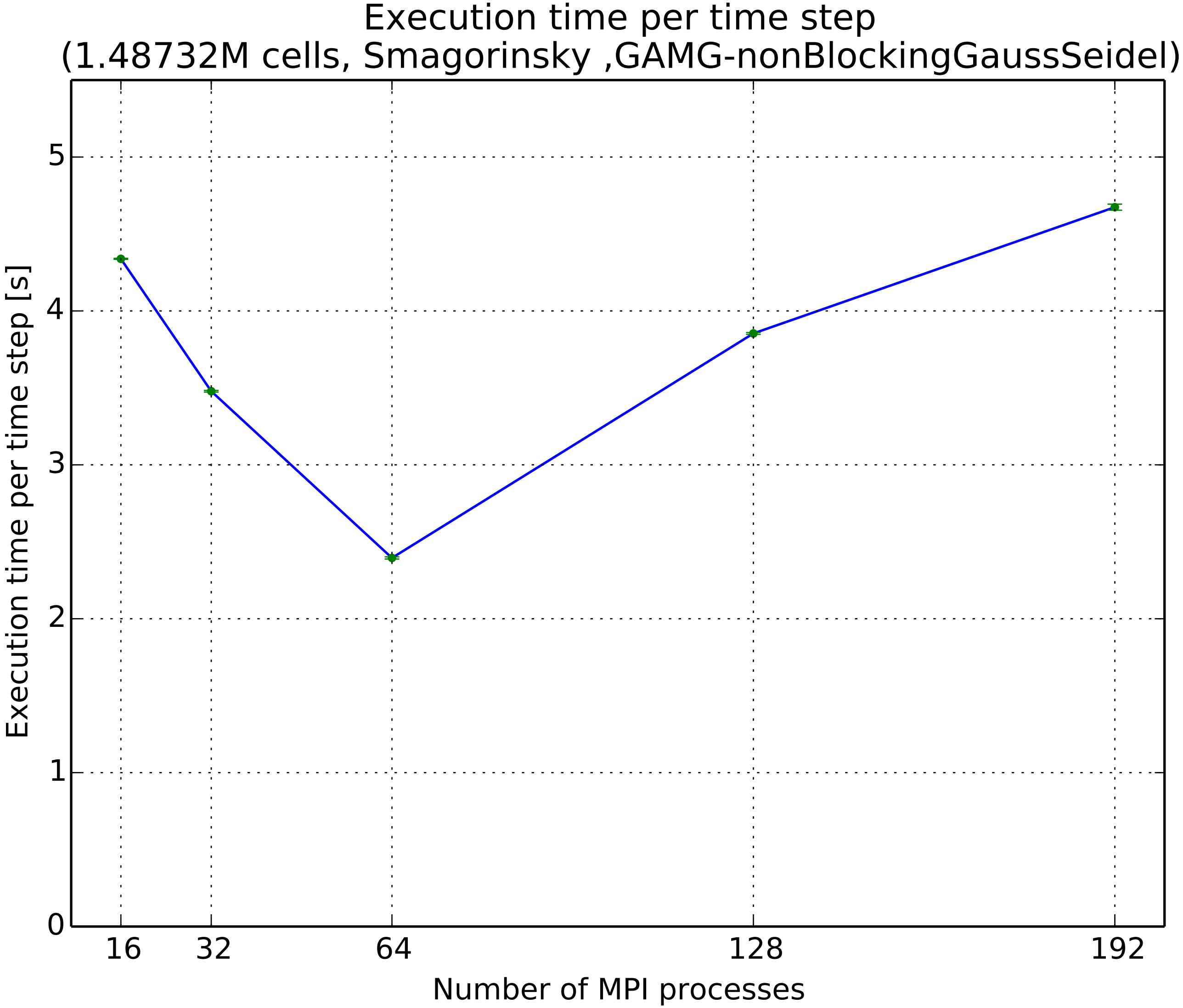
128
192
Number of MPI processes


Execution time per time step
(1.48732M cells, Smagorinsky ,GAMG-nonBlockingGaussSeidel)
Execution time per time step [s]
0
1
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16
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128
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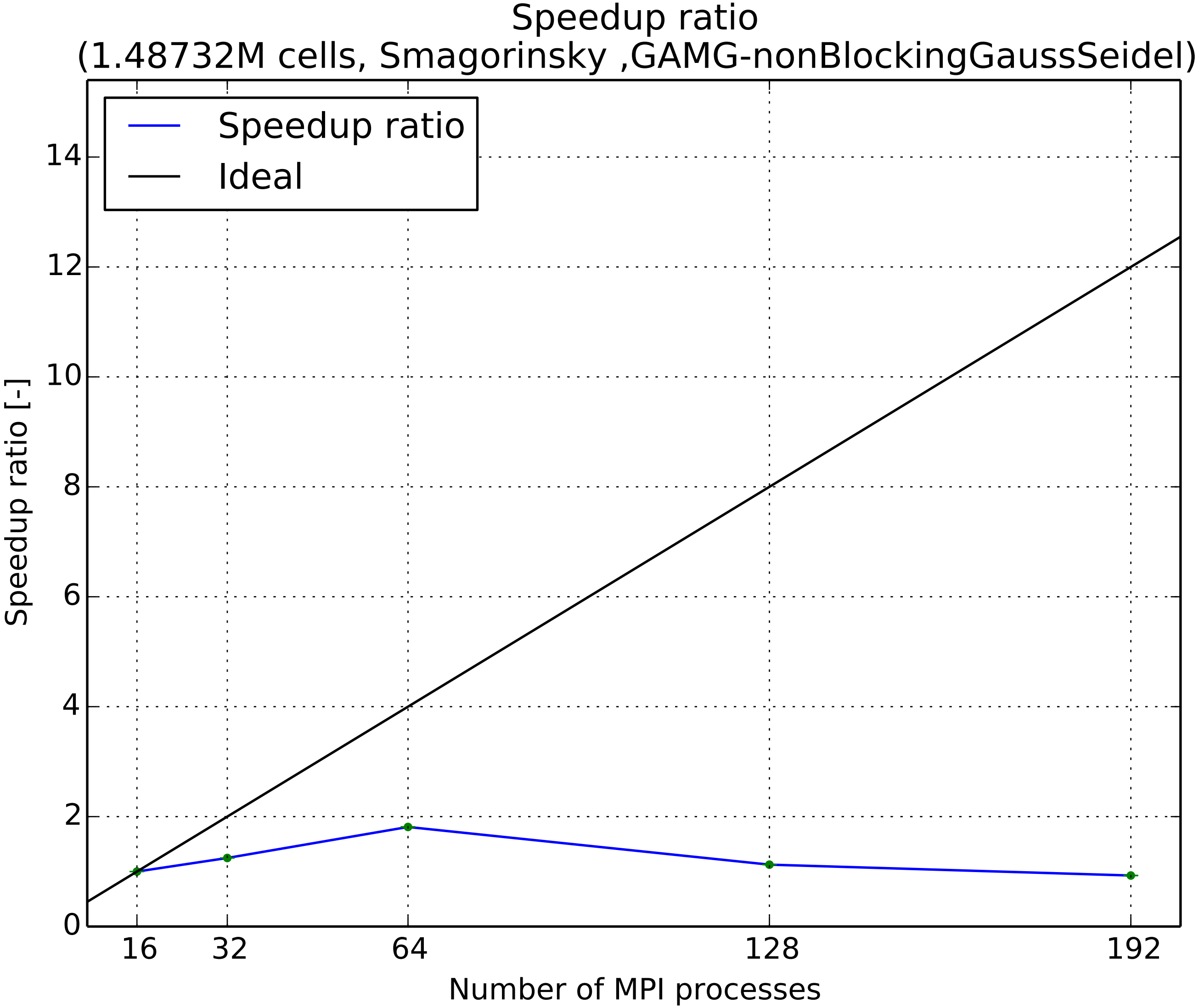
Number of MPI processes


Speedup ratio
(1.48732M cells, Smagorinsky ,GAMG-nonBlockingGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
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128
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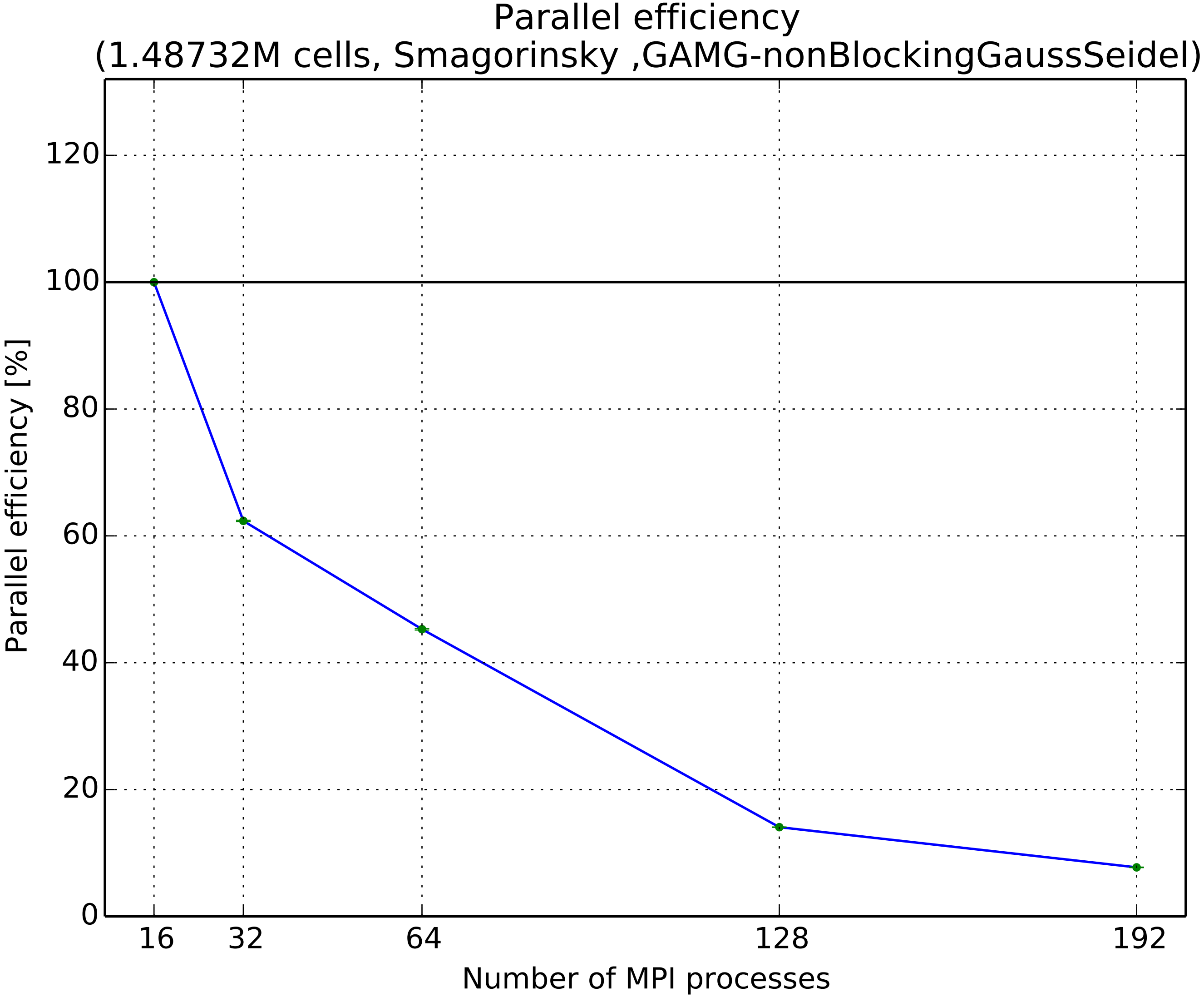
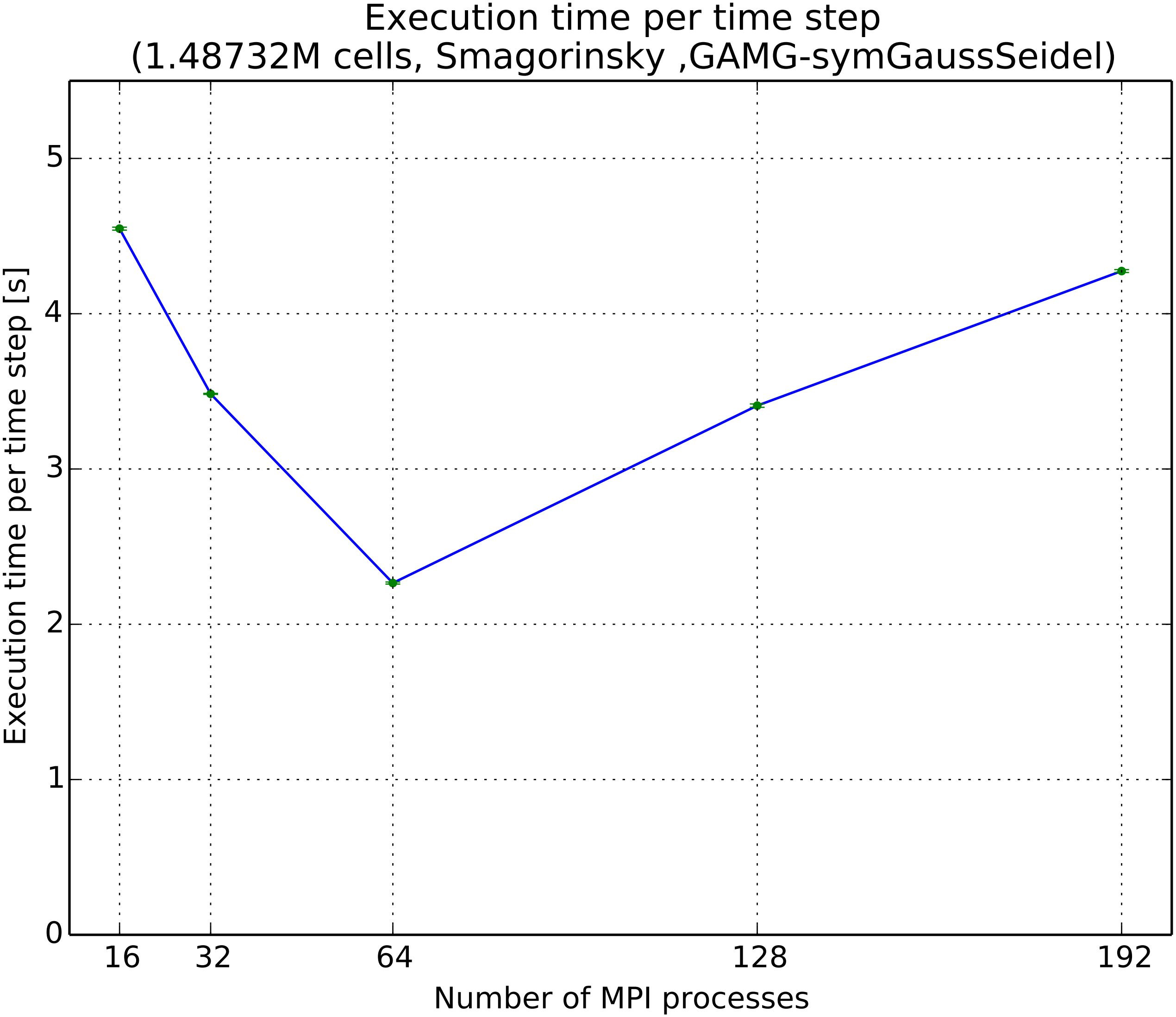
Number of MPI processes


Parallel efficiency
(1.48732M cells, Smagorinsky ,GAMG-nonBlockingGaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes


Execution time per time step
(1.48732M cells, Smagorinsky ,GAMG-symGaussSeidel)
Execution time per time step [s]
0
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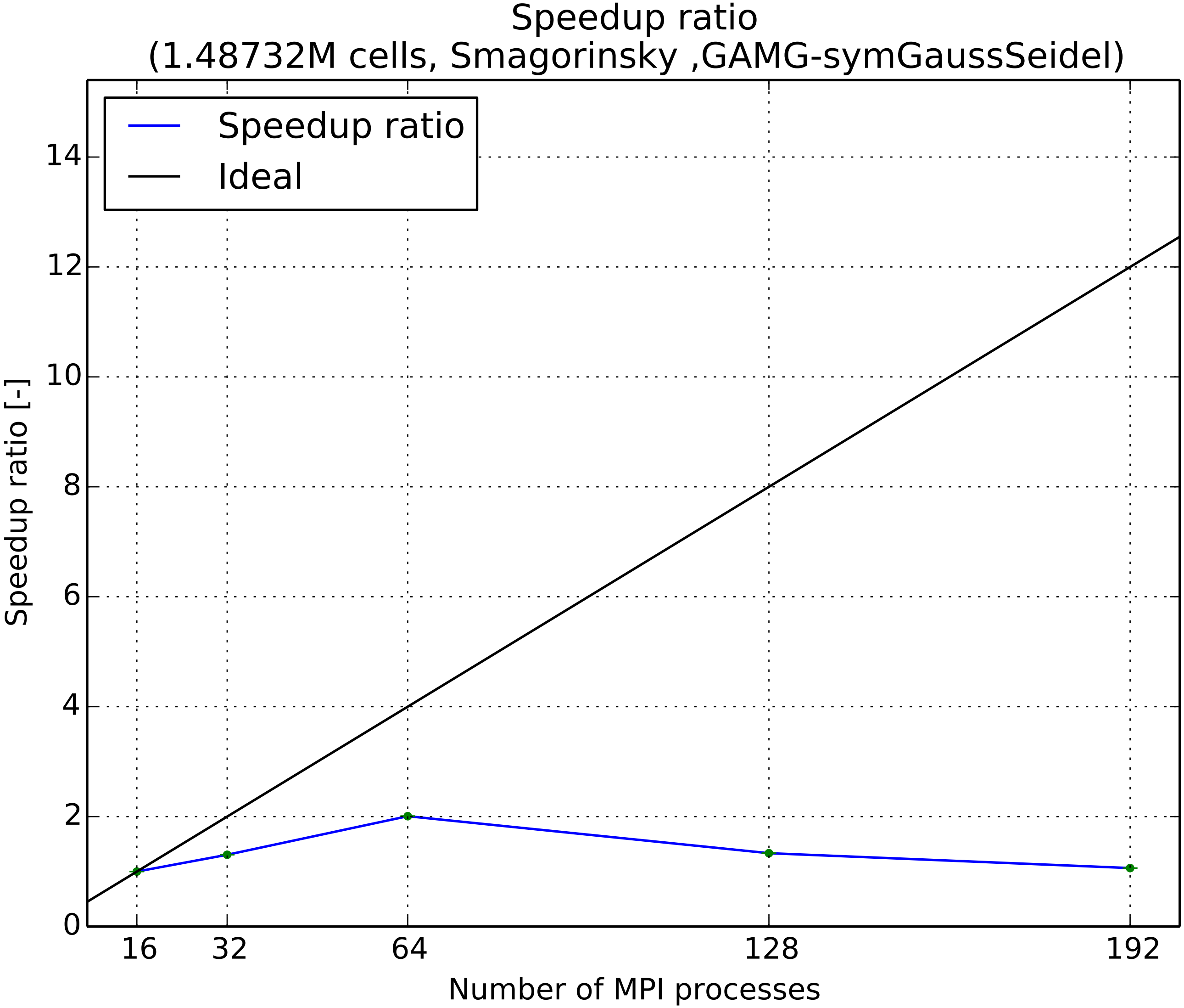
128
192
Number of MPI processes


Speedup ratio
(1.48732M cells, Smagorinsky ,GAMG-symGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
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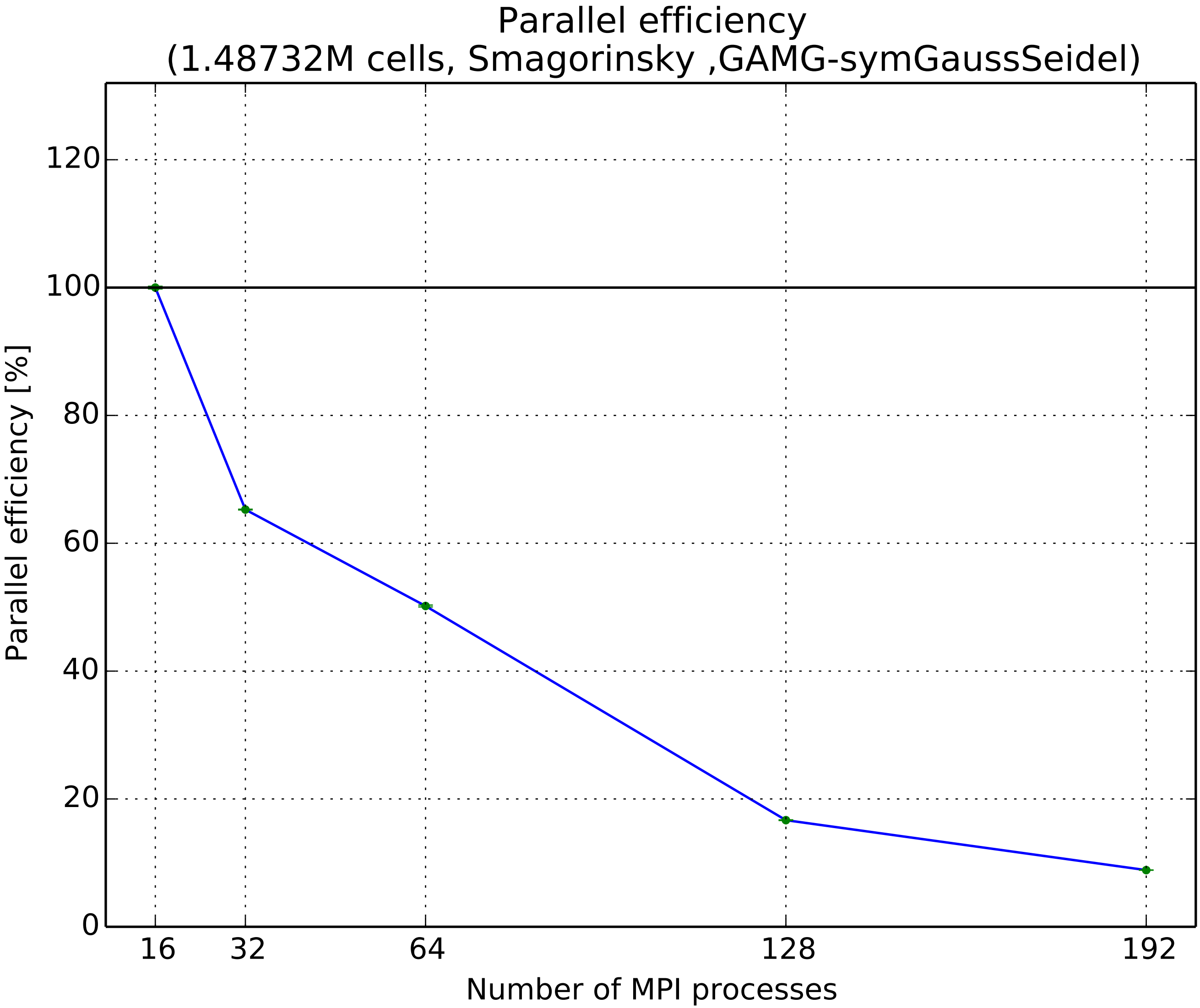
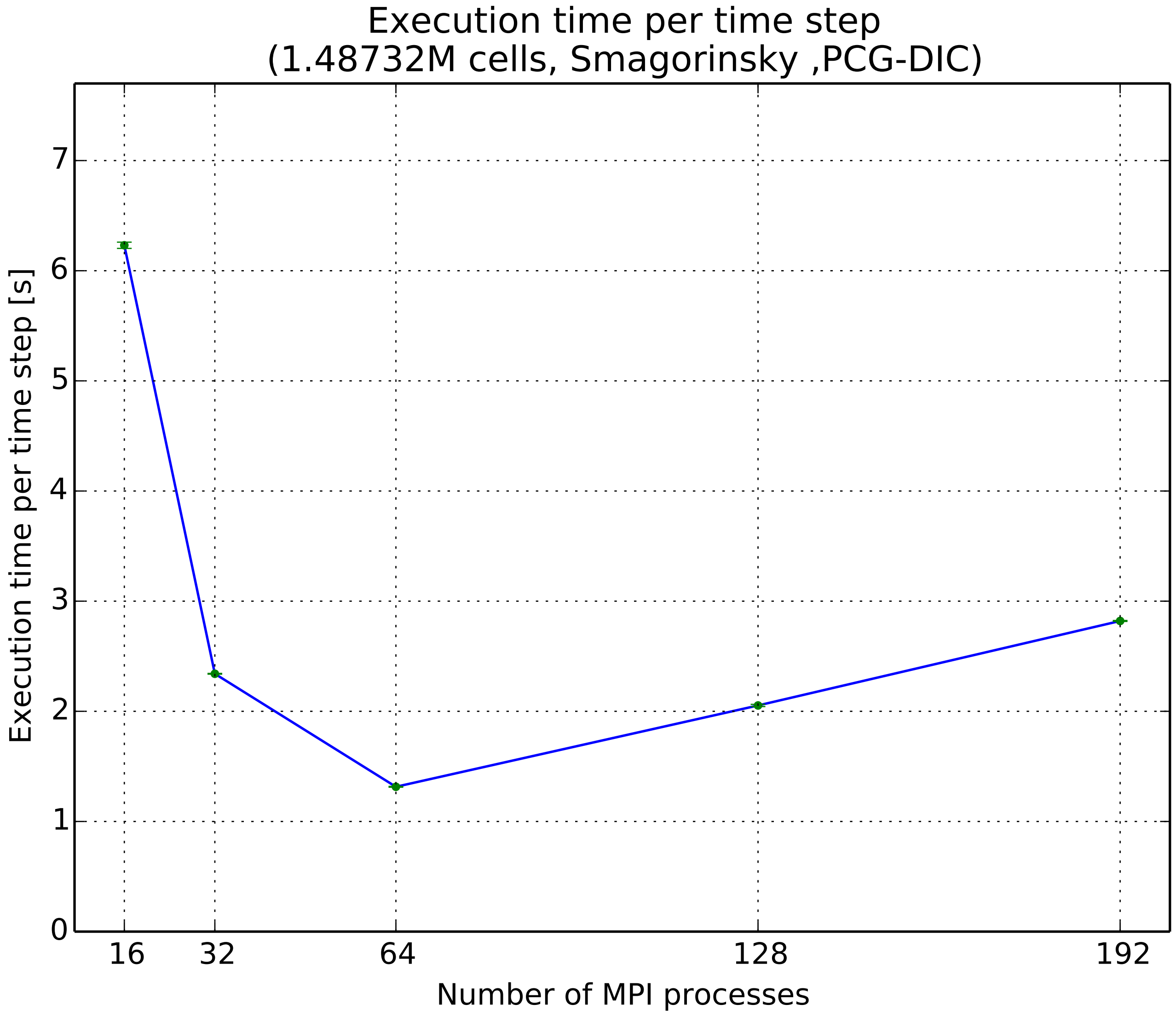
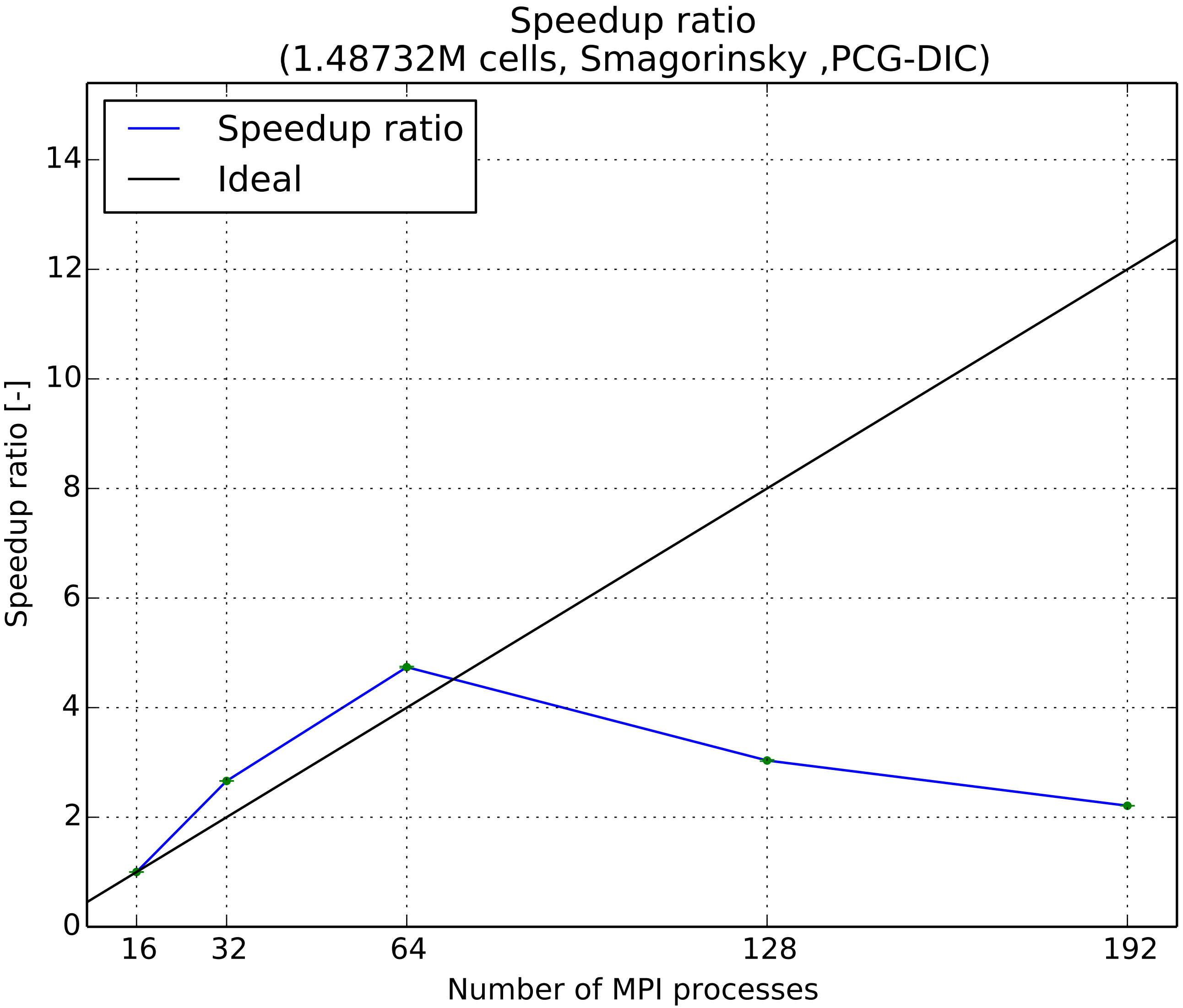
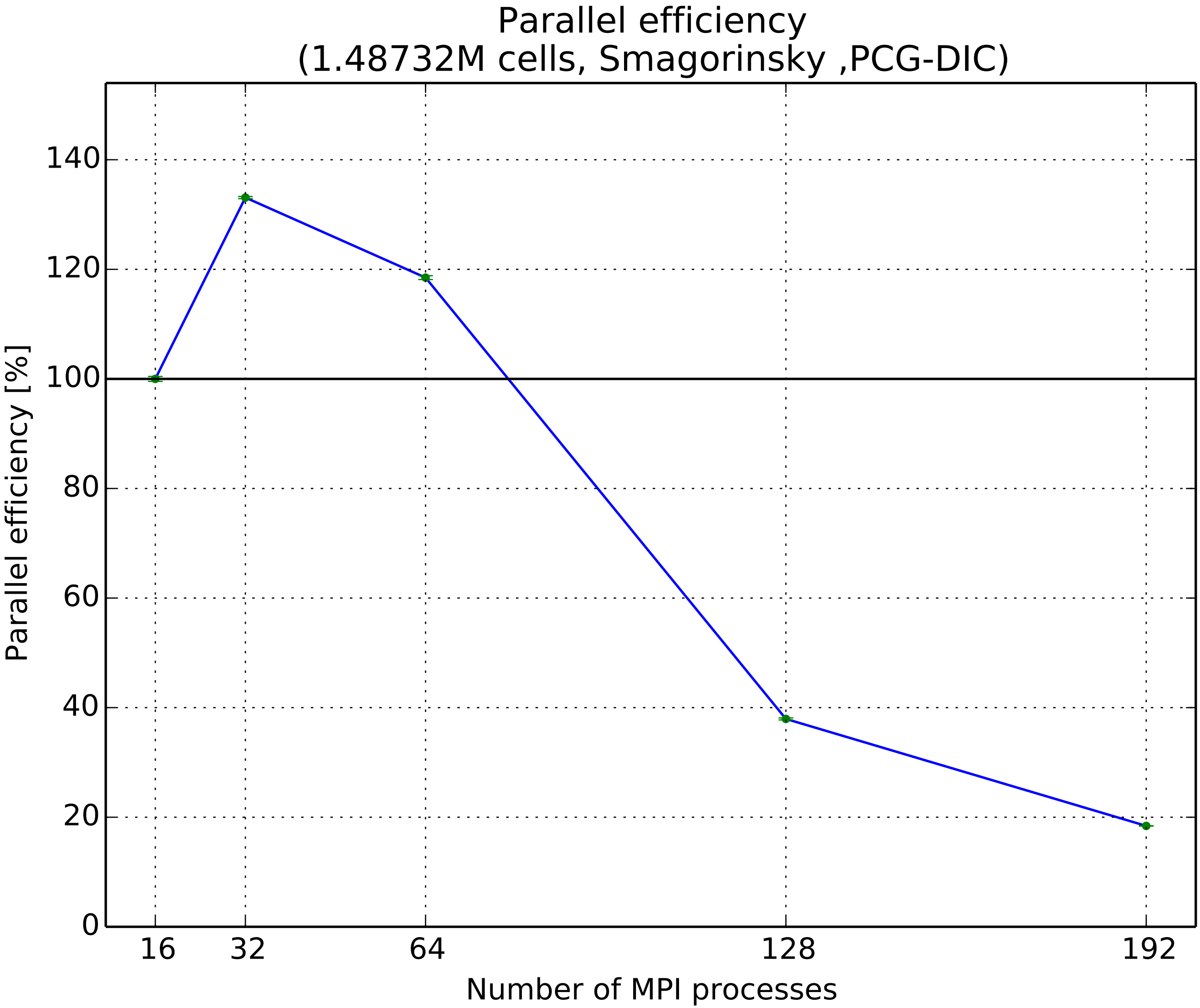
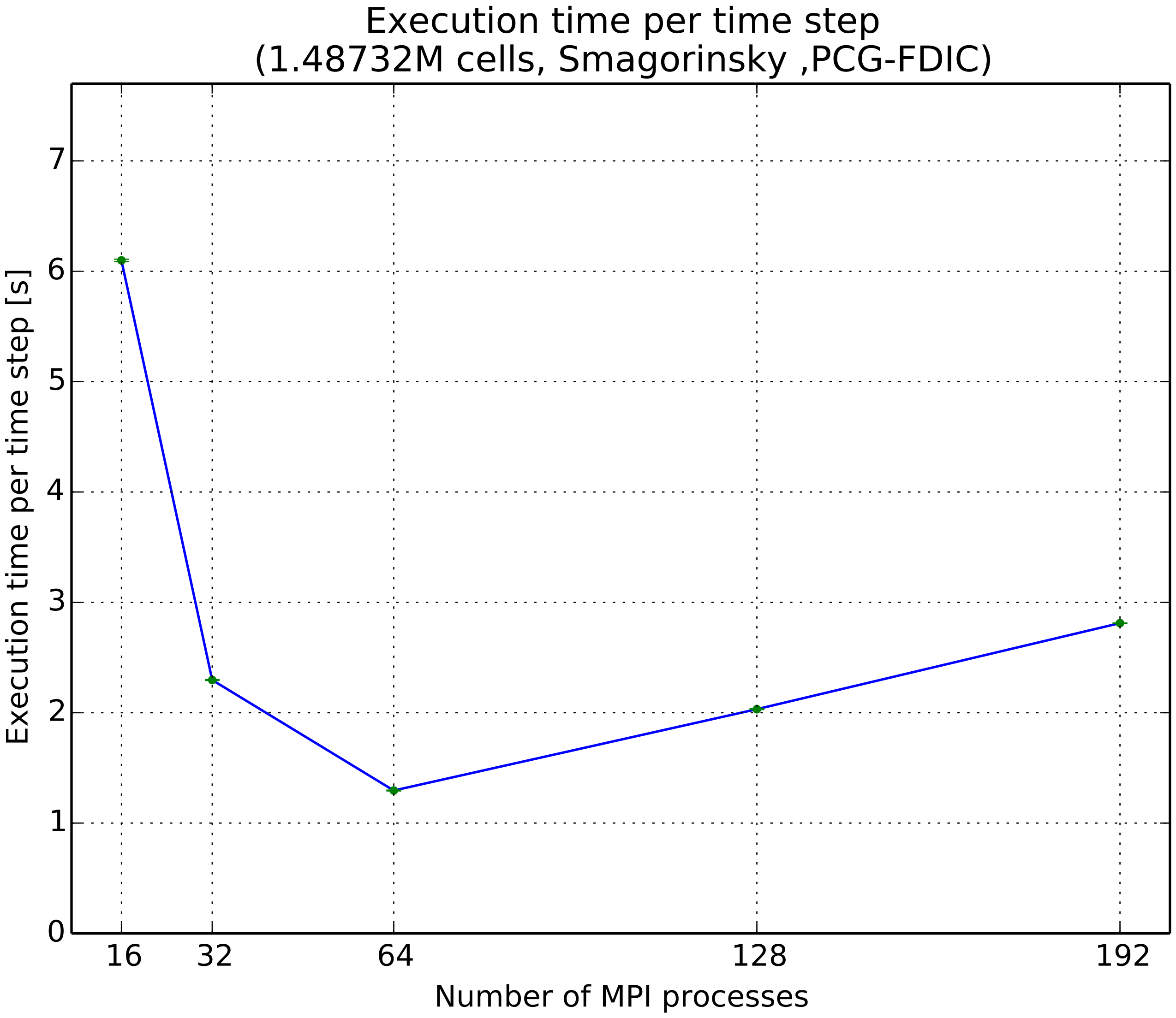
128
192
Number of MPI processes

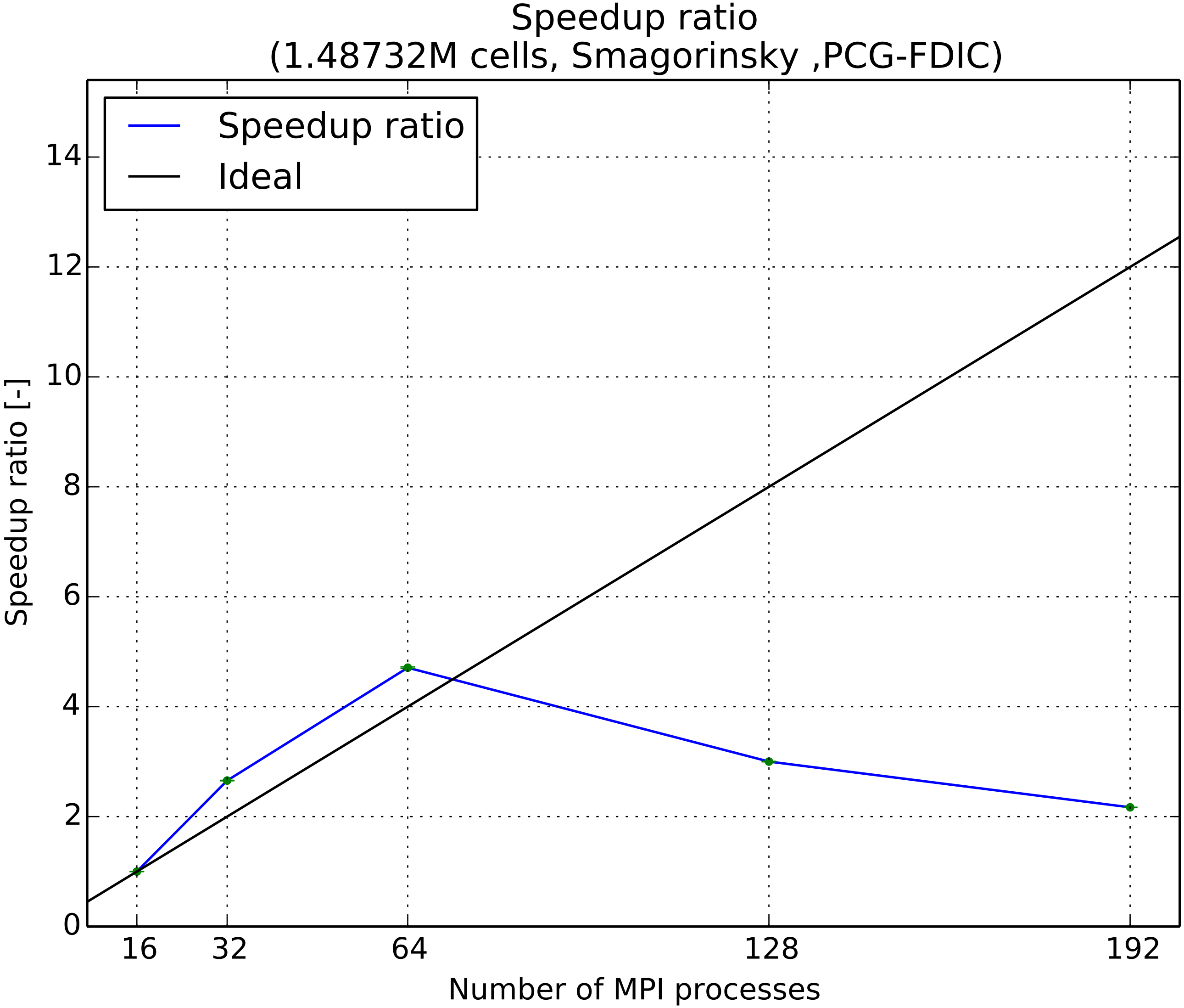

Parallel efficiency
(1.48732M cells, Smagorinsky ,GAMG-symGaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes


Execution time per time step
(1.48732M cells, Smagorinsky ,PCG-DIC)
Execution time per time step [s]
0
1
2
3
4
5
6
7
16
32
64
128
192
Number of MPI processes


Speedup ratio
(1.48732M cells, Smagorinsky ,PCG-DIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes


Parallel efficiency
(1.48732M cells, Smagorinsky ,PCG-DIC)
Parallel efficiency [%]
0
20
40
60
80
100
120
140
16
32
64
128
192
Number of MPI processes


Execution time per time step
(1.48732M cells, Smagorinsky ,PCG-FDIC)
Execution time per time step [s]
0
1
2
3
4
5
6
7
16
32
64
128
192
Number of MPI processes


Speedup ratio
(1.48732M cells, Smagorinsky ,PCG-FDIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
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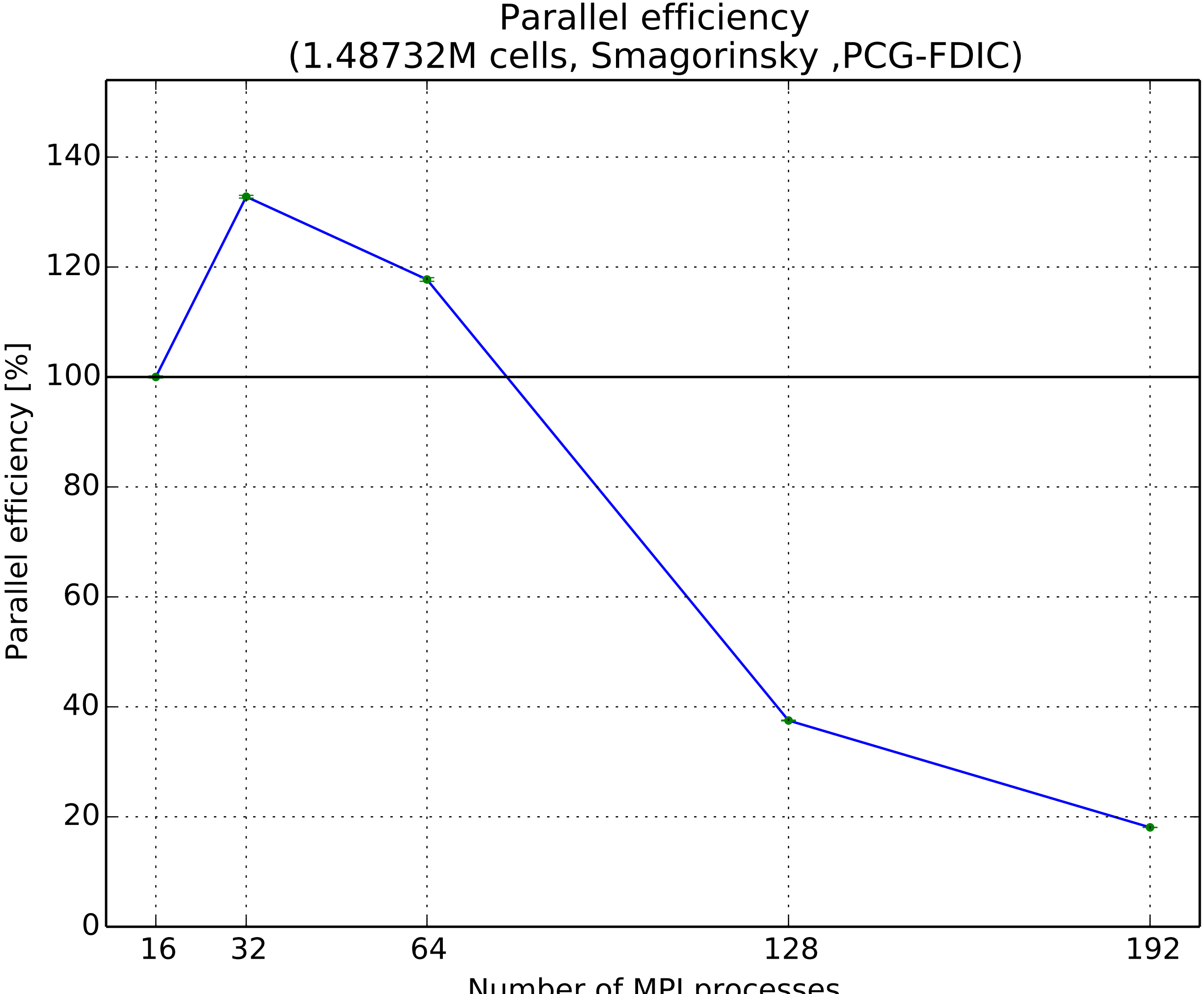
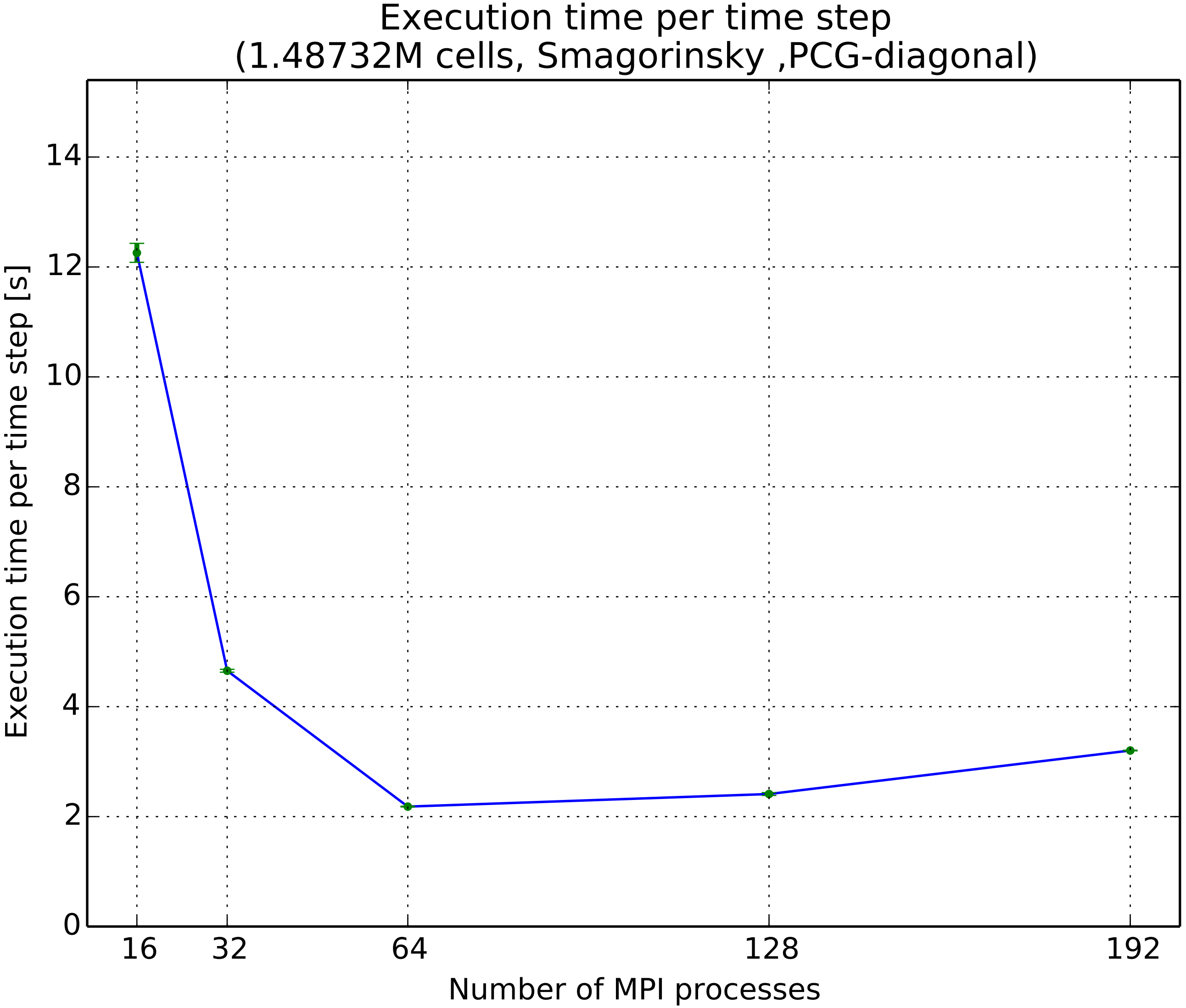
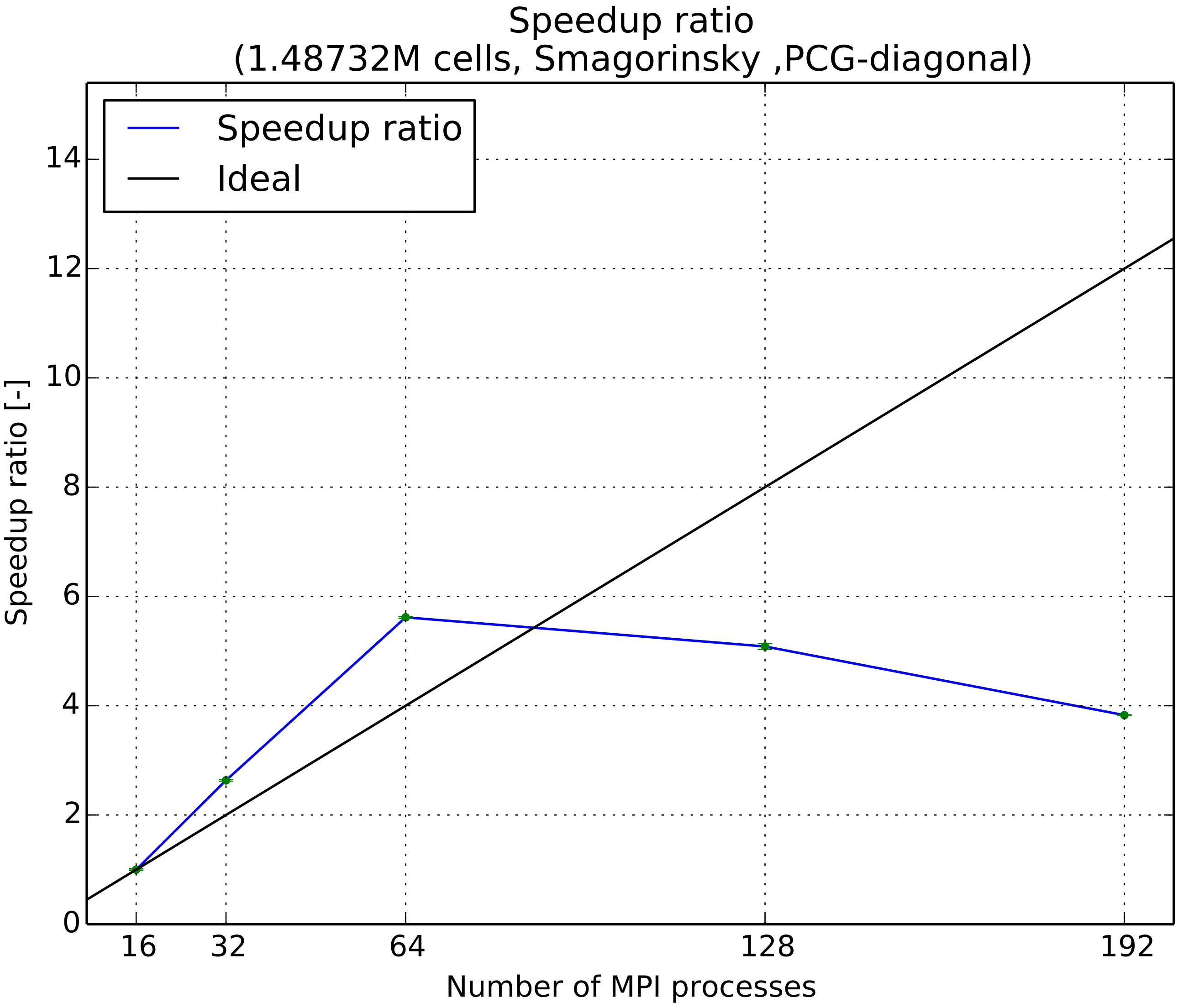
10
12
14
16
32
64
128
192
Number of MPI processes


Parallel efficiency
(1.48732M cells, Smagorinsky ,PCG-FDIC)
Parallel efficiency [%]
0
20
40
60
80
100
120
140
16
32
64
128
192
Number of MPI processes

Execution time per time step
(1.48732M cells, Smagorinsky ,PCG-diagonal)
Execution time per time step [s]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes


Speedup ratio
(1.48732M cells, Smagorinsky ,PCG-diagonal)
Speedup ratio
Ideal
Speedup ratio [-]
0
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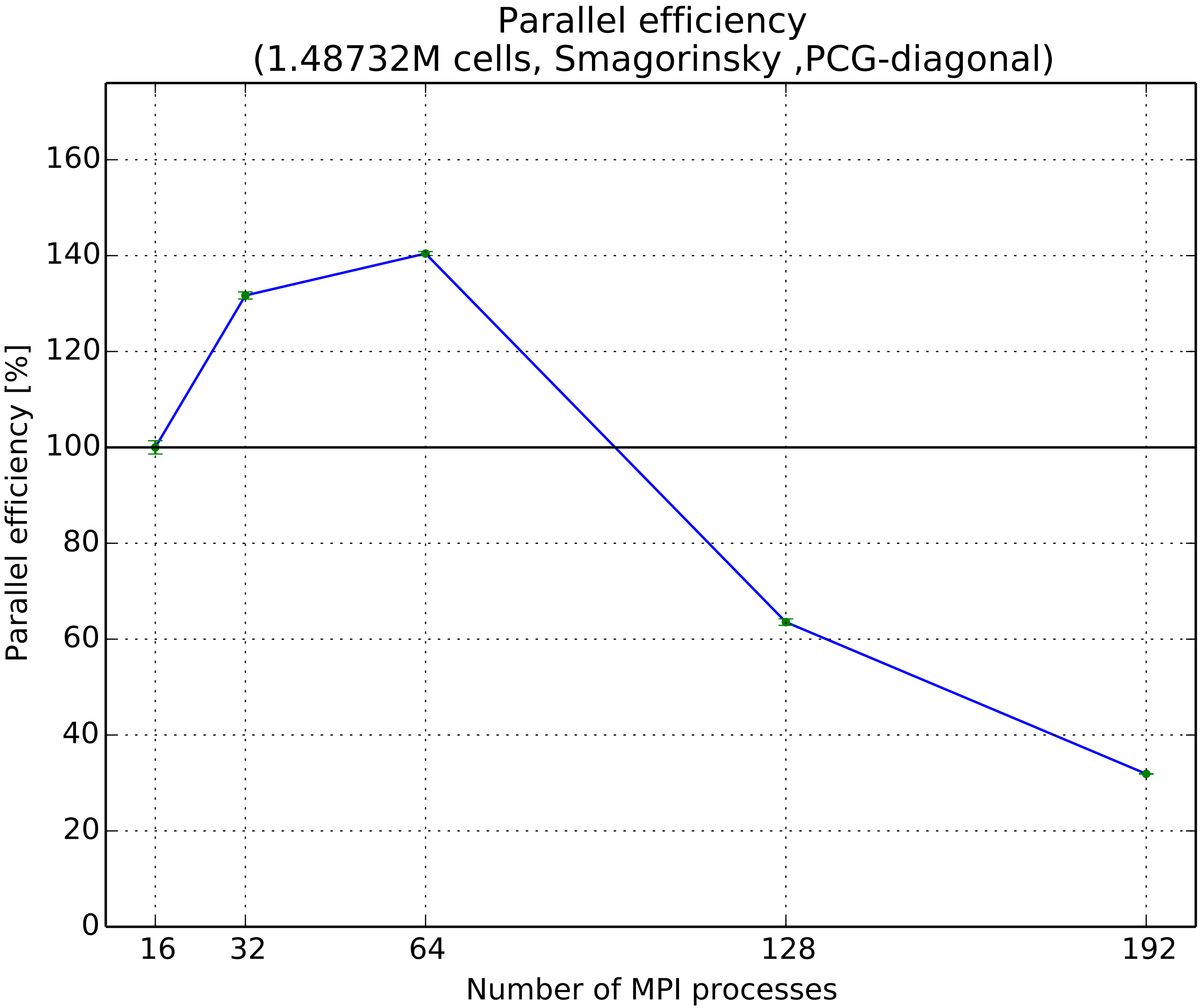
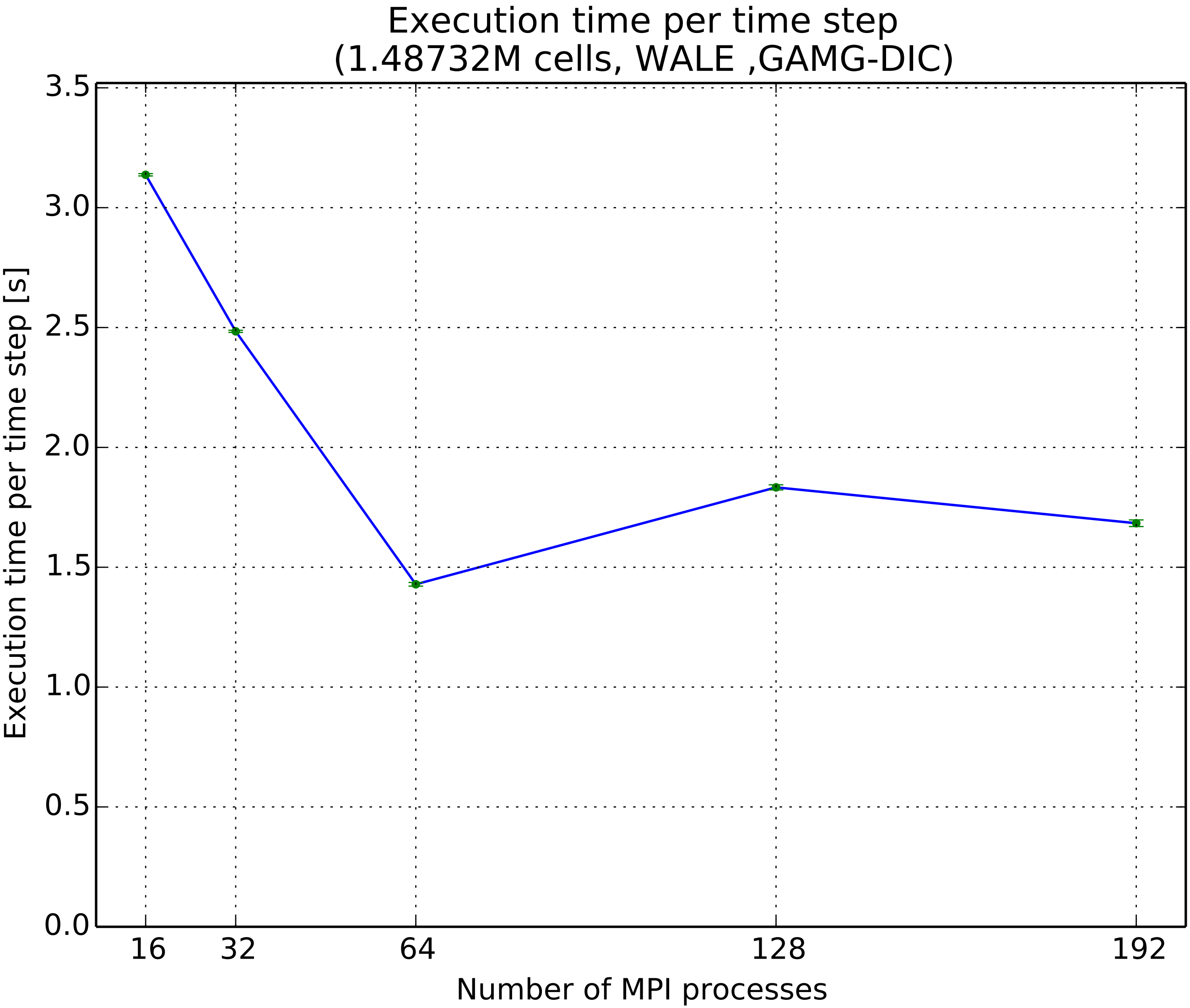
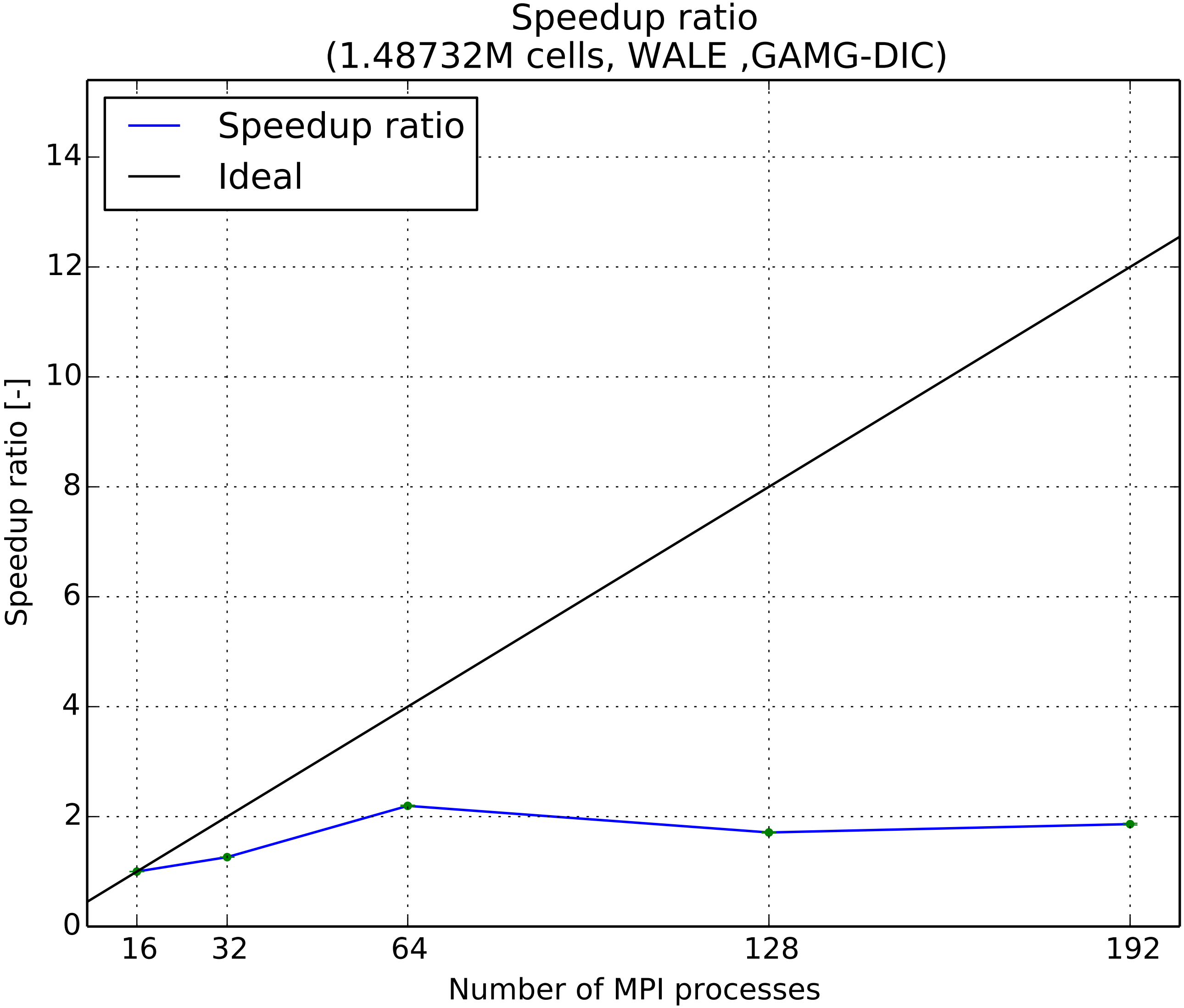
14
16
32
64
128
192
Number of MPI processes


Parallel efficiency
(1.48732M cells, Smagorinsky ,PCG-diagonal)
Parallel efficiency [%]
0
20
40
60
80
100
120
140
160
16
32
64
128
192
Number of MPI processes


Execution time per time step
(1.48732M cells, WALE ,GAMG-DIC)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
16
32
64
128
192
Number of MPI processes


Speedup ratio
(1.48732M cells, WALE ,GAMG-DIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
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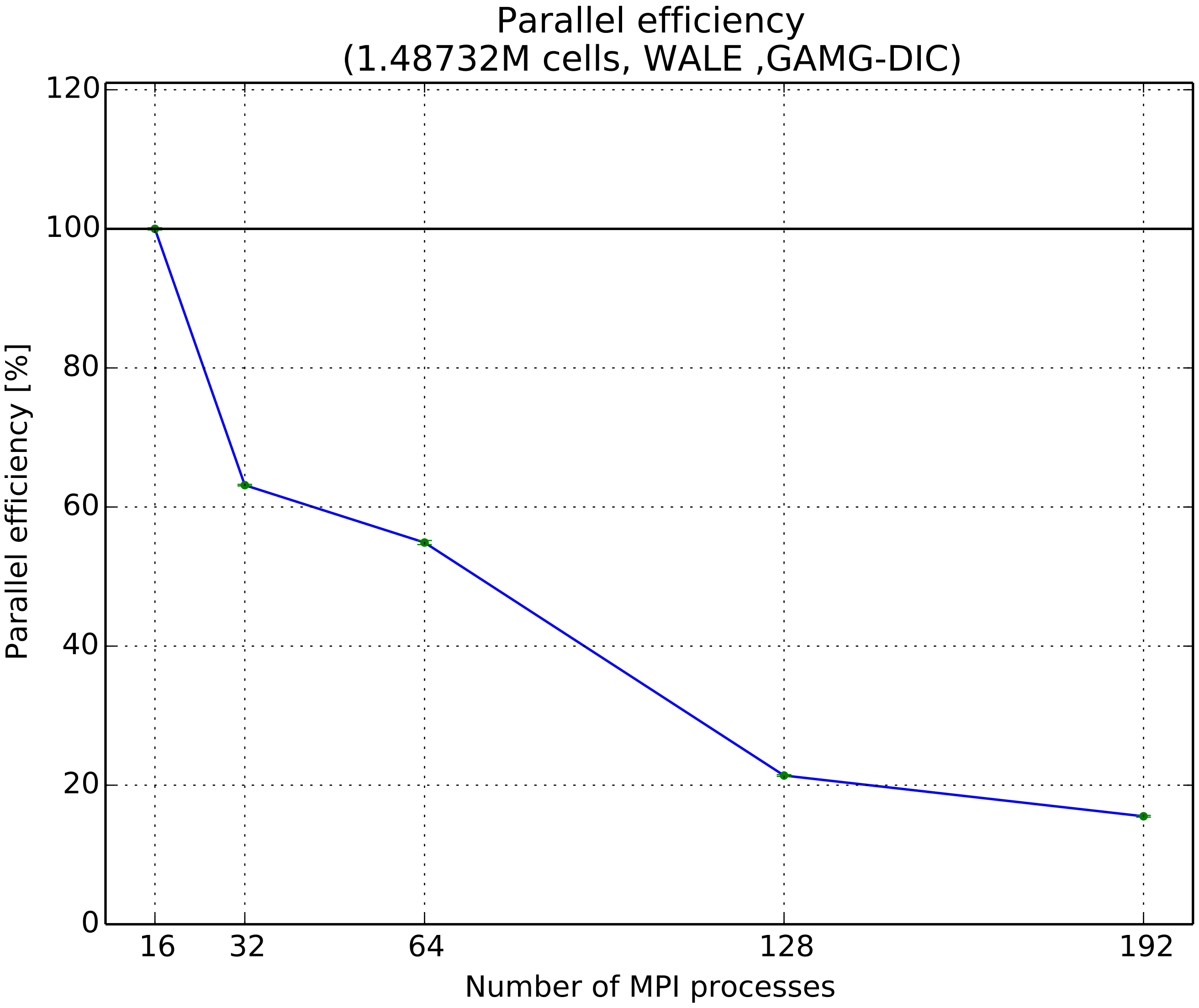
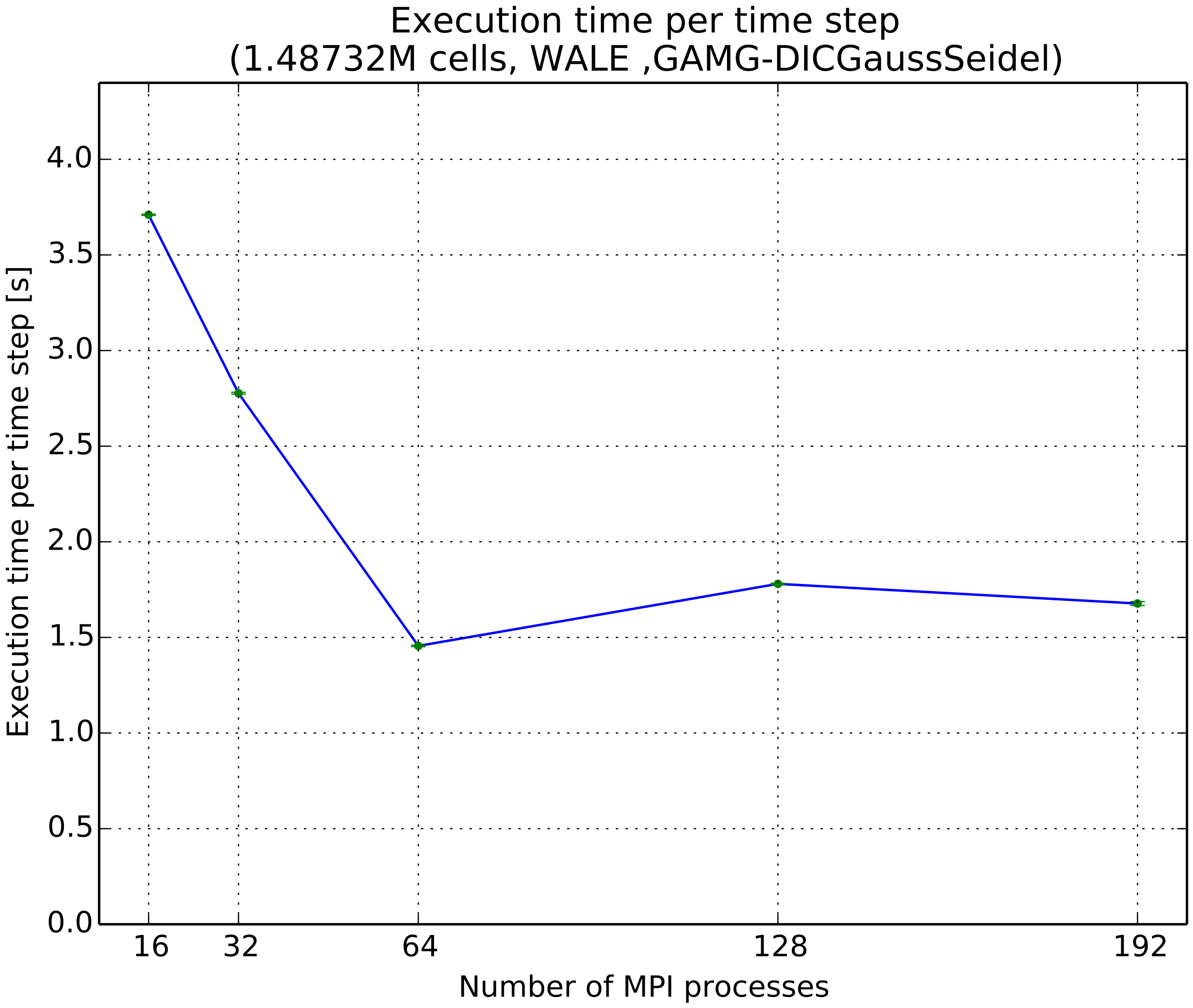
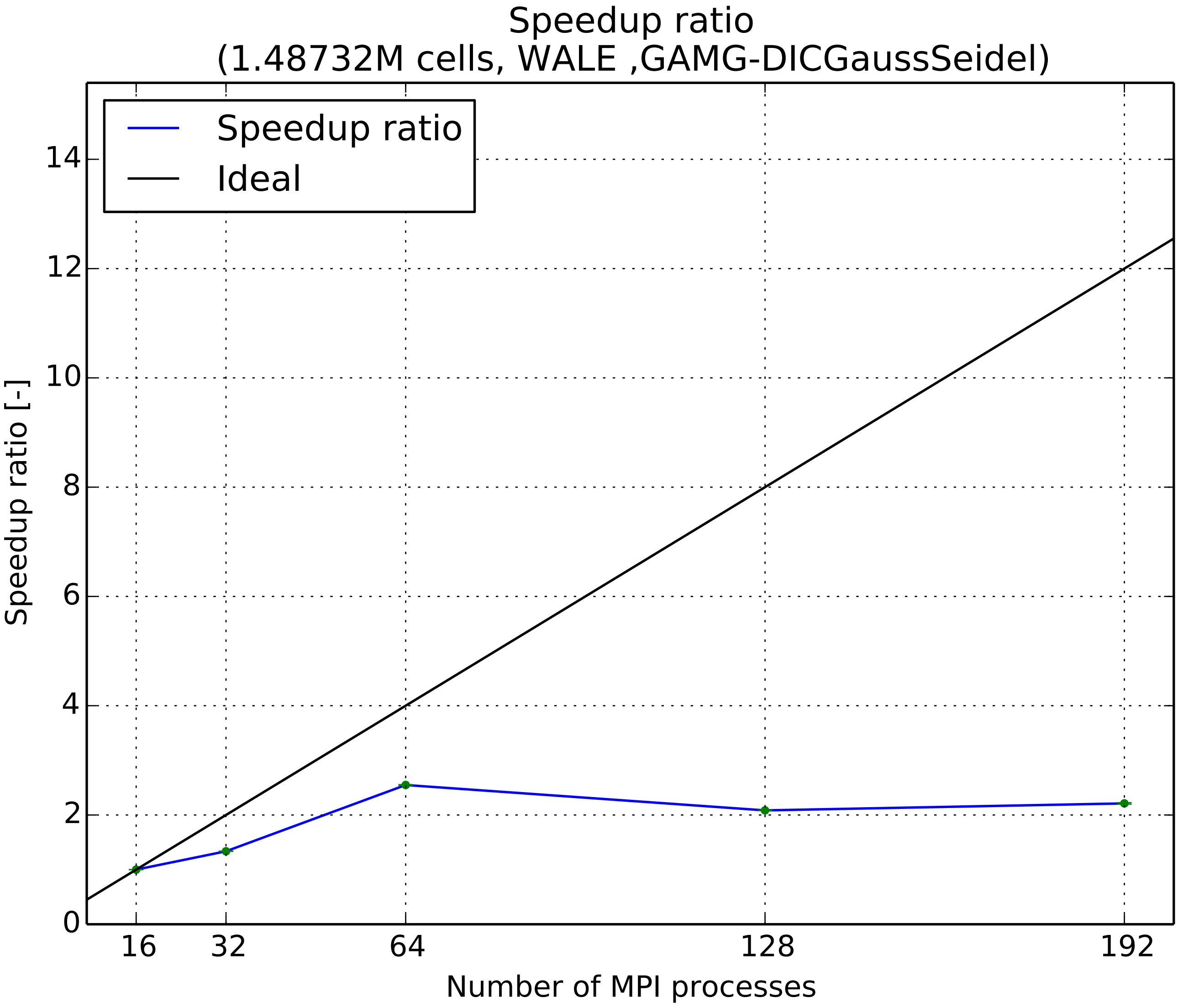
14
16
32
64
128
192
Number of MPI processes


Parallel efficiency
(1.48732M cells, WALE ,GAMG-DIC)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes


Execution time per time step
(1.48732M cells, WALE ,GAMG-DICGaussSeidel)
Execution time per time step [s]
Number of MPI processes
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
16
32
64
128
192


Speedup ratio
(1.48732M cells, WALE ,GAMG-DICGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
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4
6
8
10
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14
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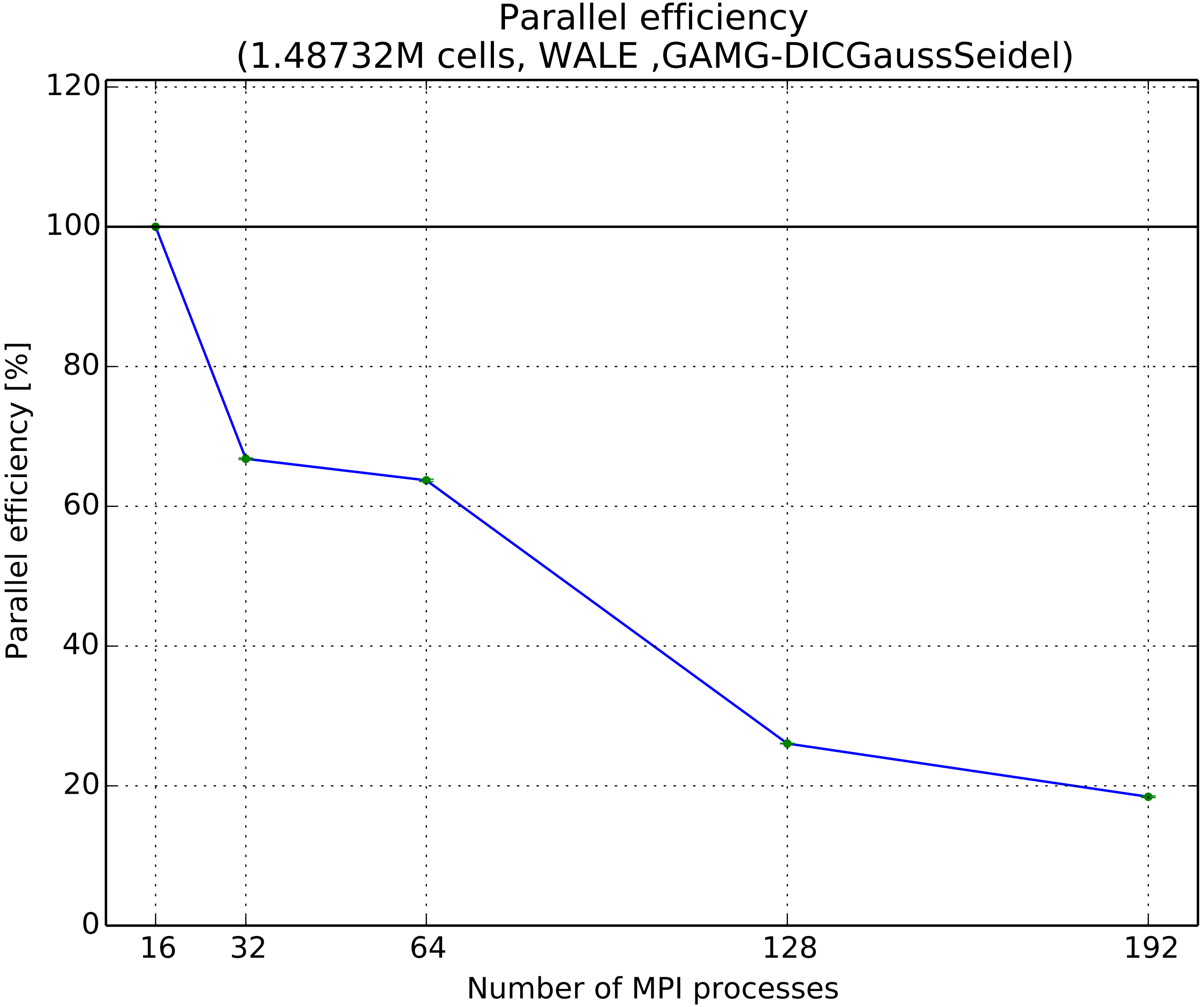
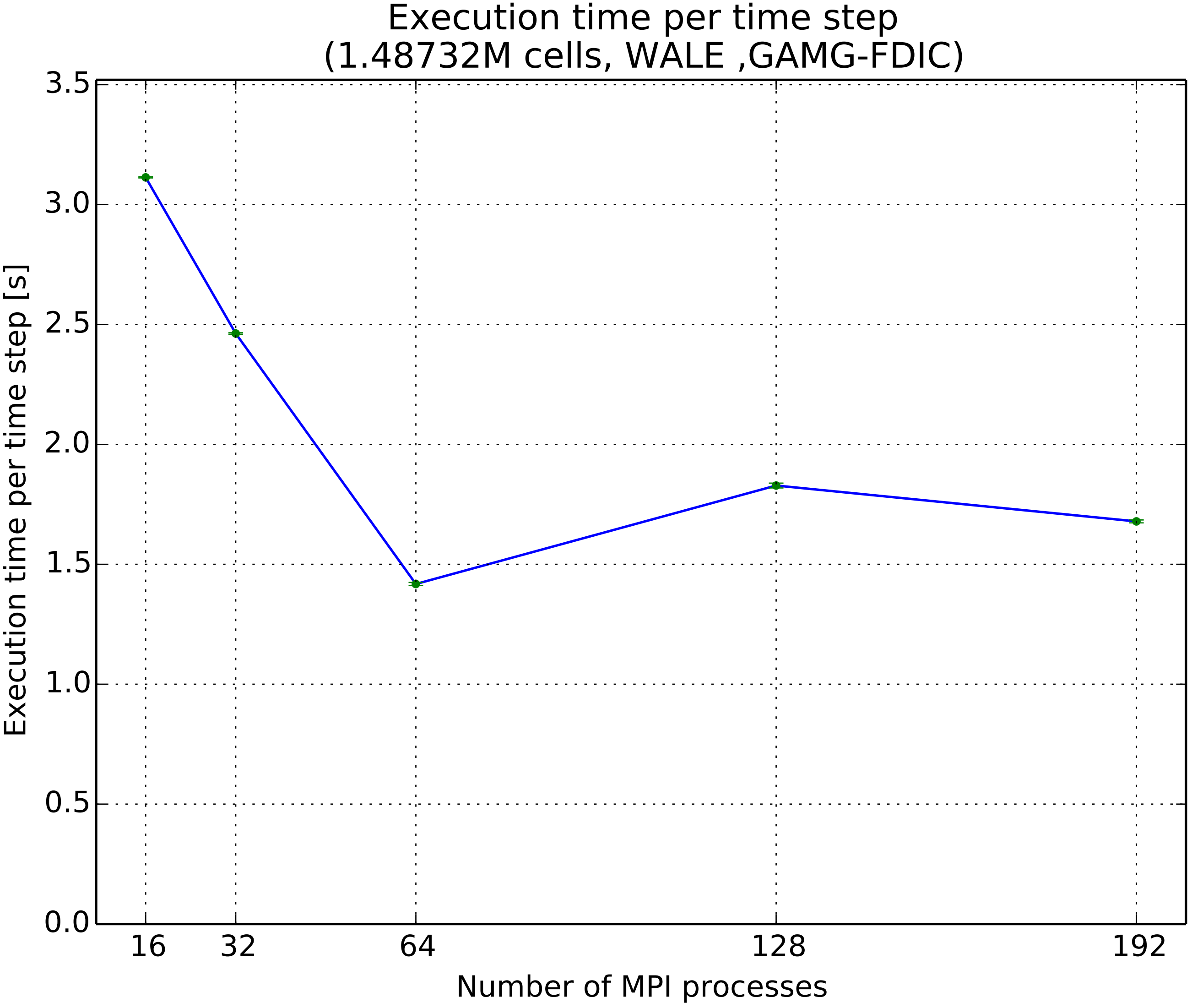
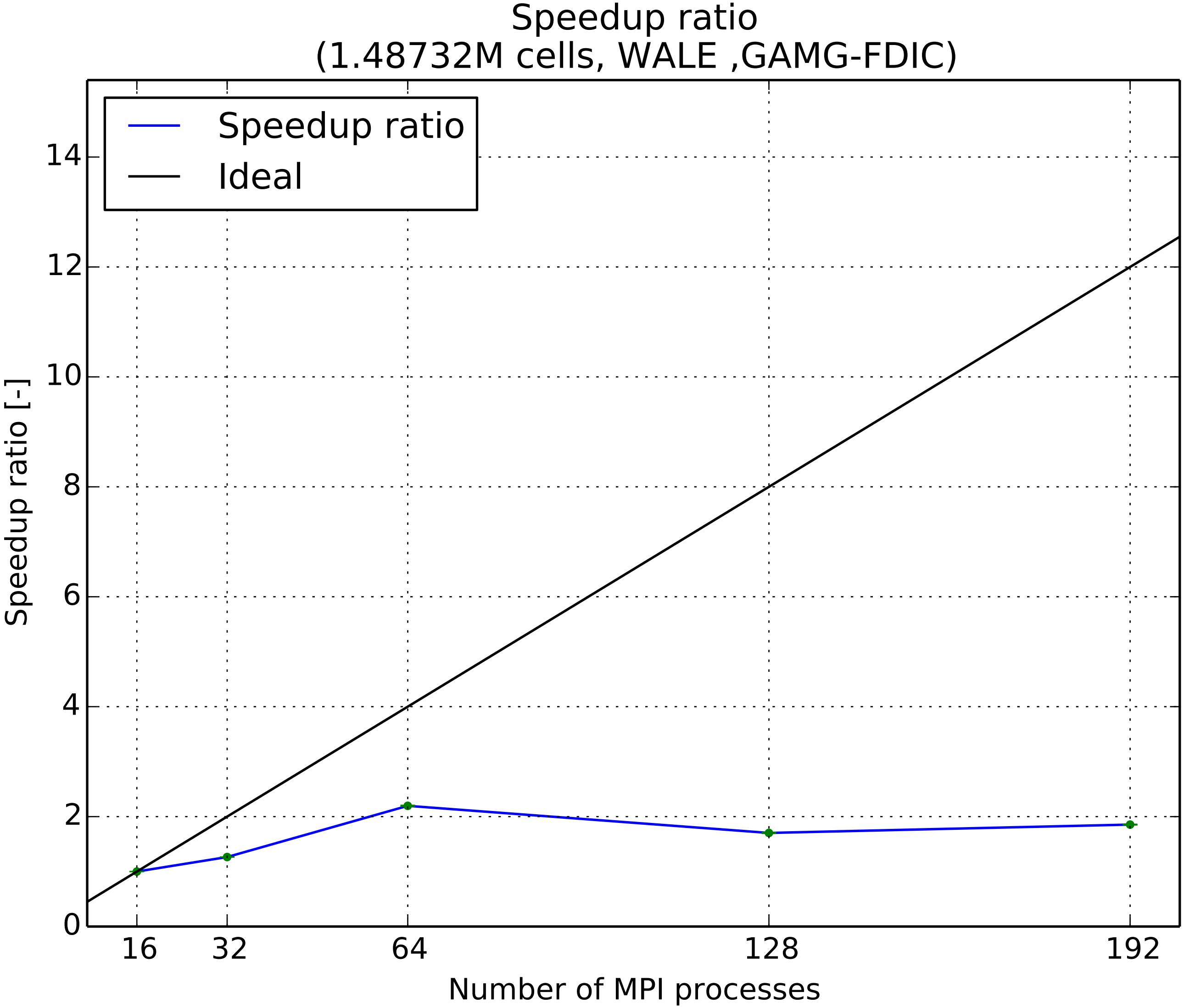
32
64
128
192
Number of MPI processes


Parallel efficiency
(1.48732M cells, WALE ,GAMG-DICGaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes


Execution time per time step
(1.48732M cells, WALE ,GAMG-FDIC)
Execution time per time step [s]
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
16
32
64
128
192
Number of MPI processes


Speedup ratio
(1.48732M cells, WALE ,GAMG-FDIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
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14
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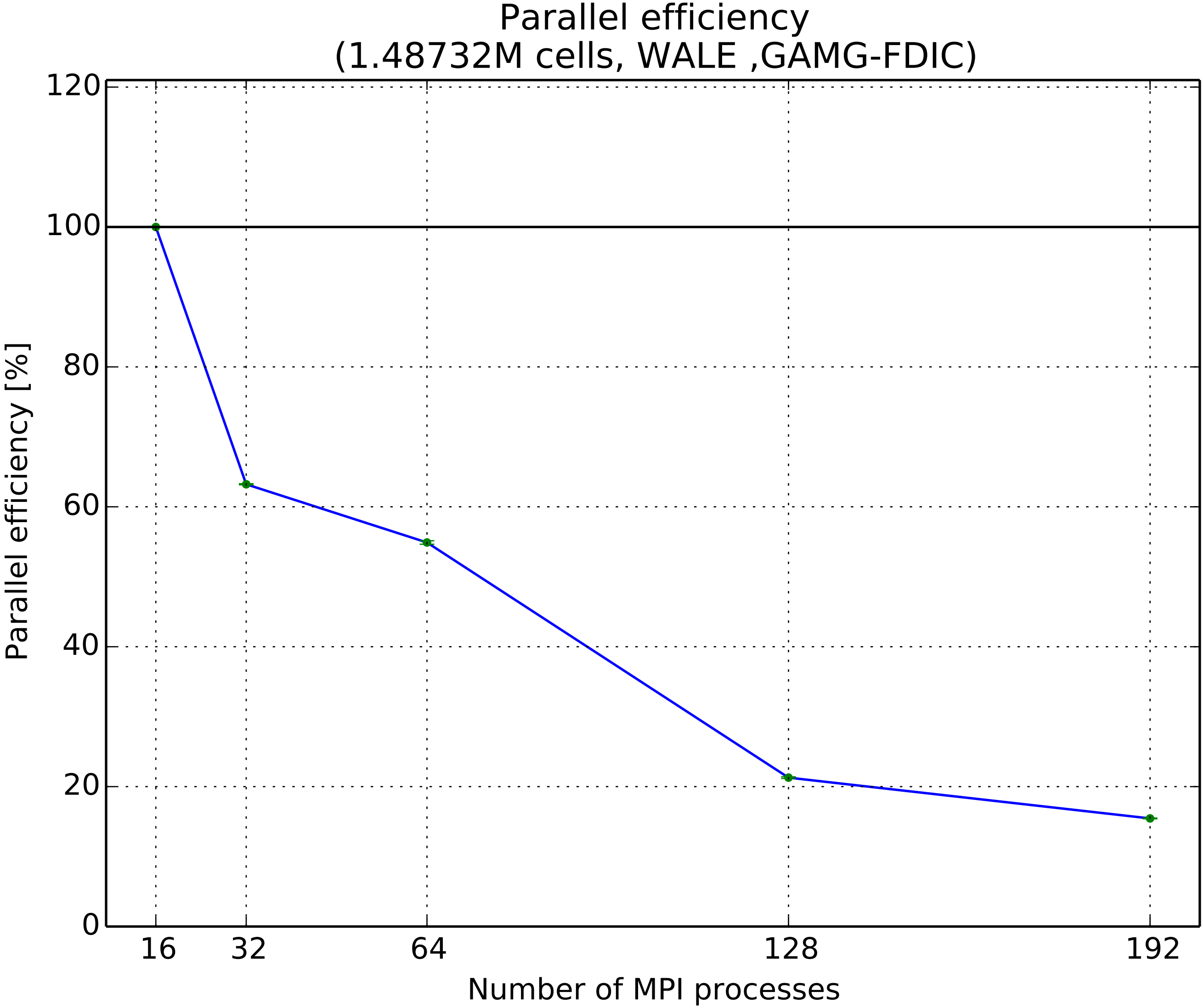
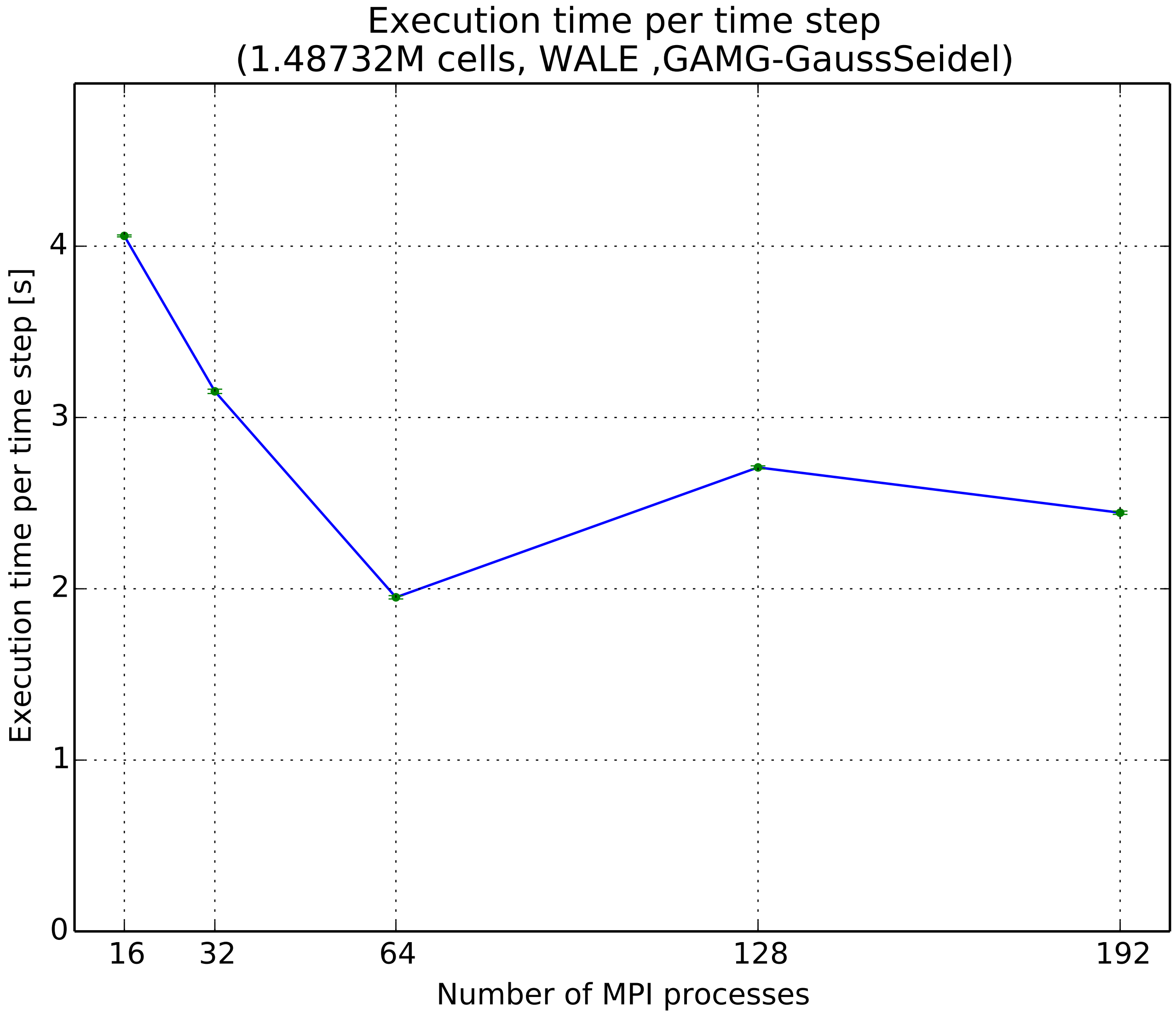
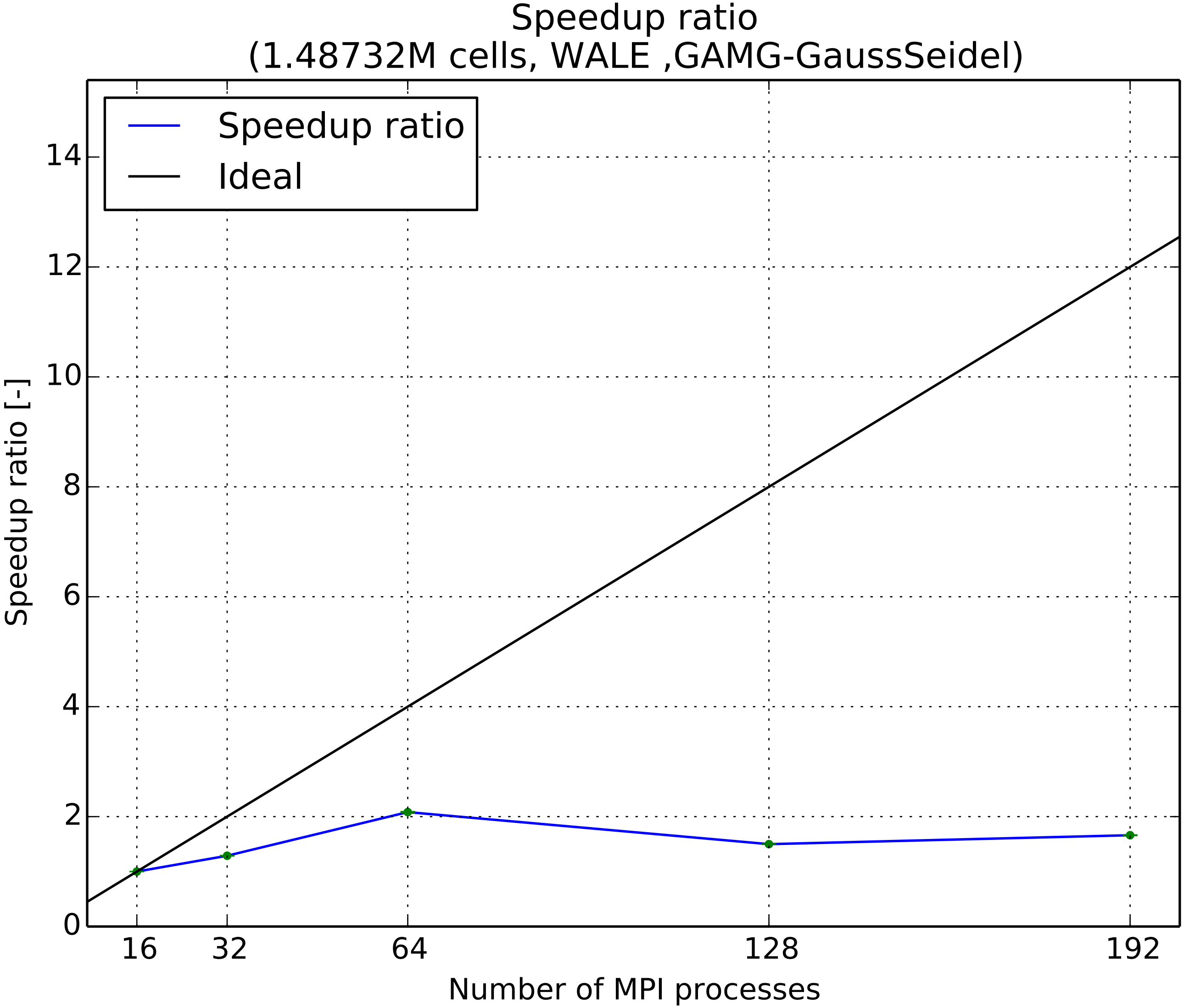
32
64
128
192
Number of MPI processes


Parallel efficiency
(1.48732M cells, WALE ,GAMG-FDIC)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes


Execution time per time step
(1.48732M cells, WALE ,GAMG-GaussSeidel)
Execution time per time step [s]
0
1
2
3
4
16
32
64
128
192
Number of MPI processes


Speedup ratio
(1.48732M cells, WALE ,GAMG-GaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
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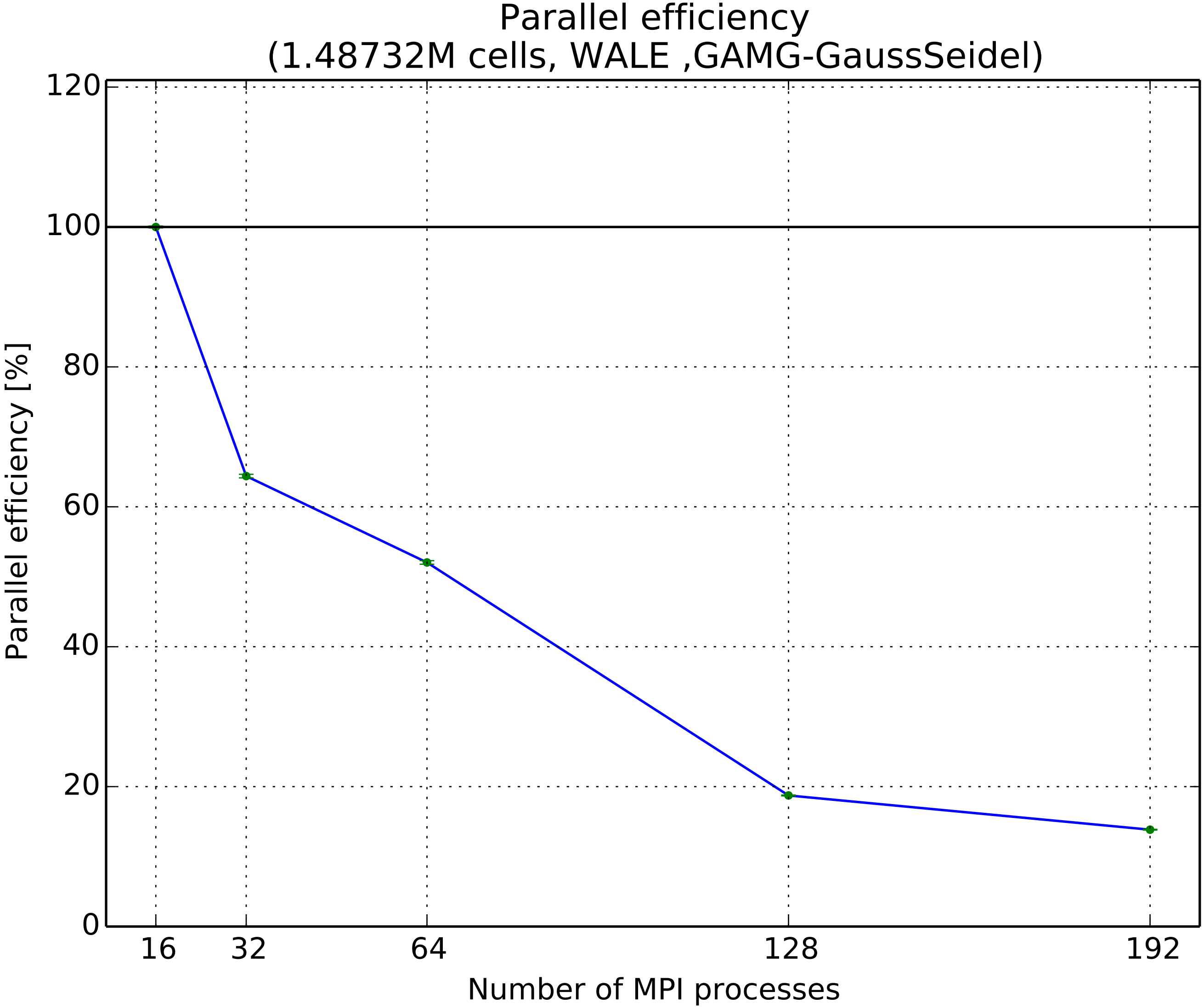
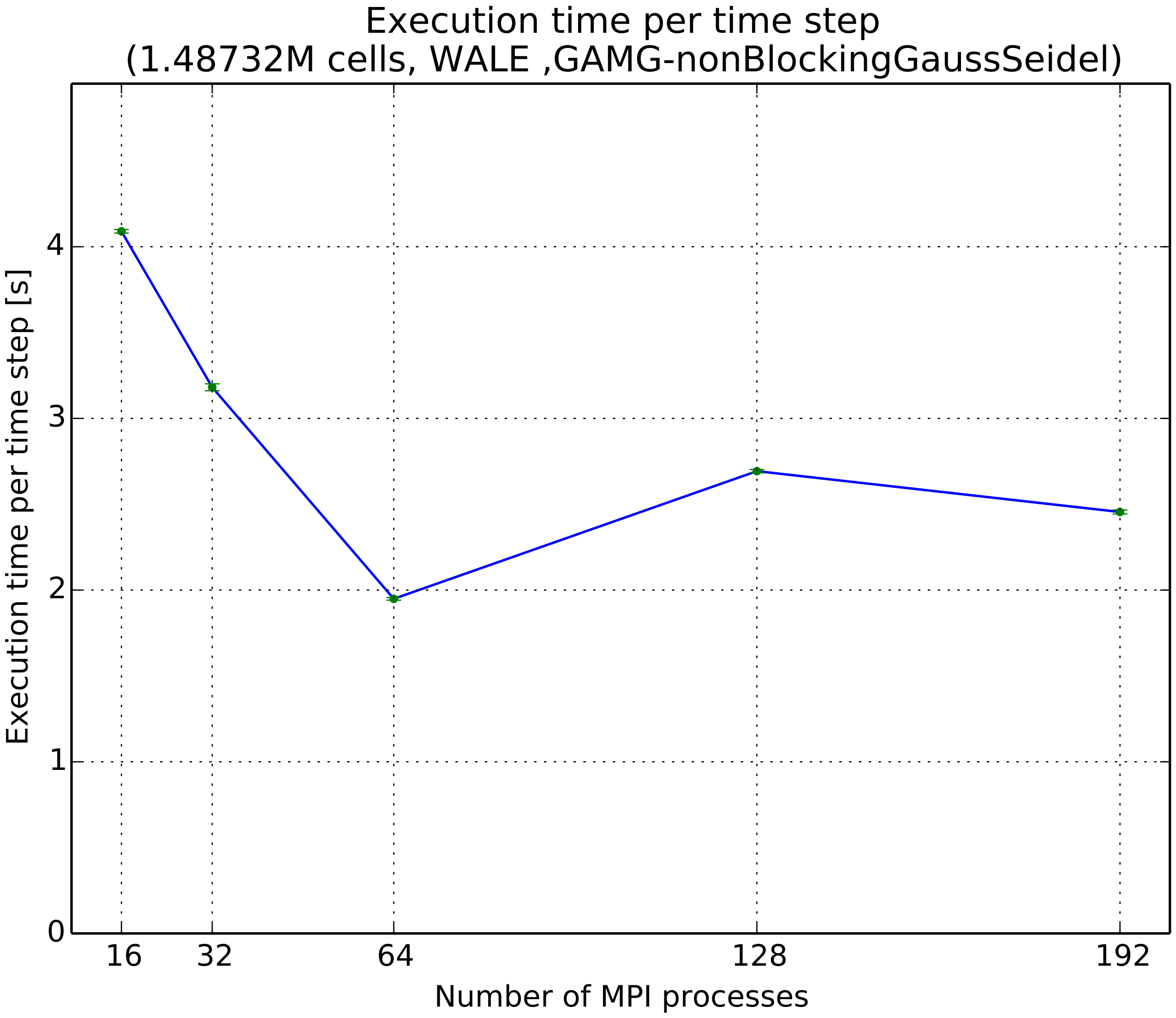
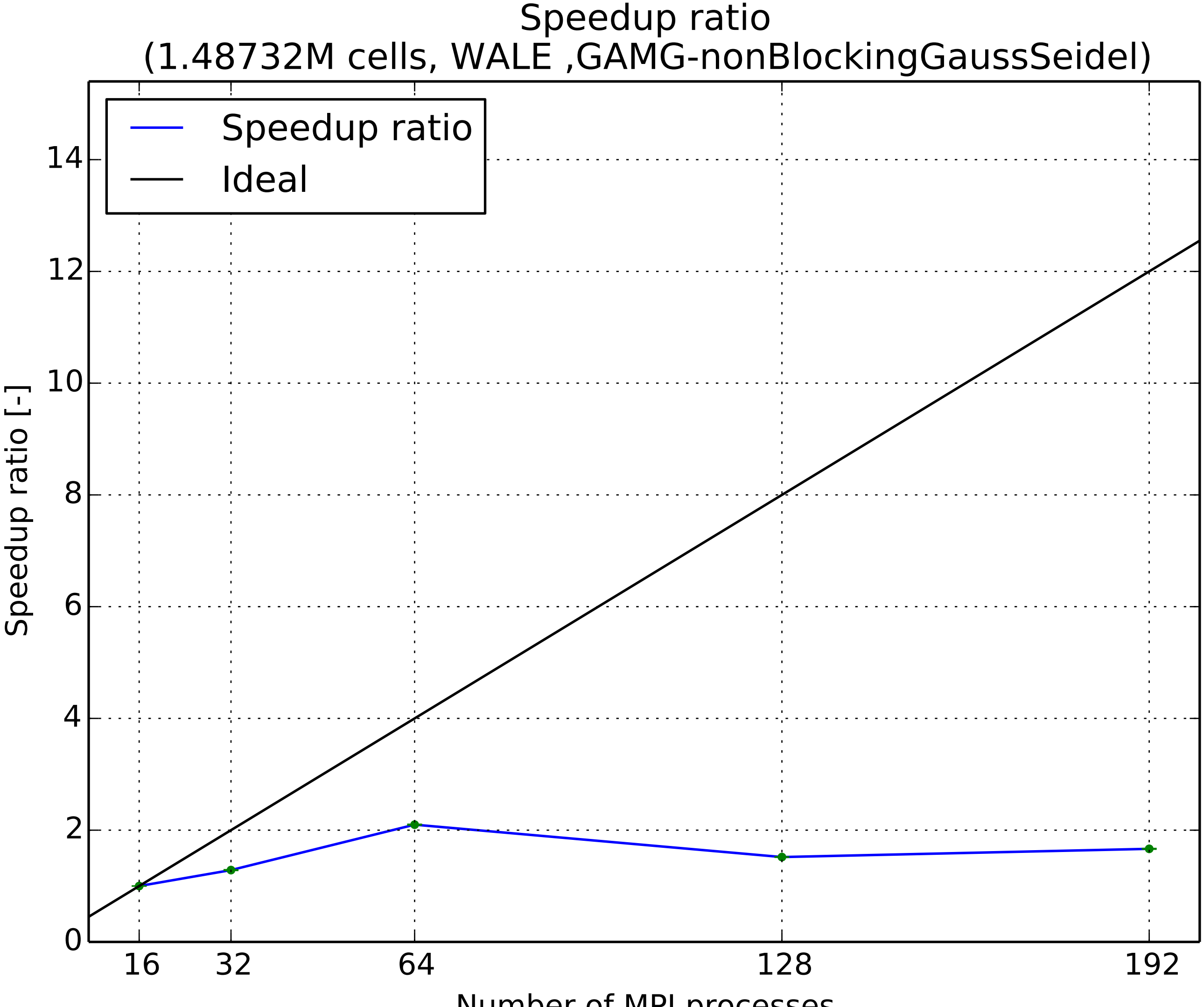
14
16
32
64
128
192
Number of MPI processes


Parallel efficiency
(1.48732M cells, WALE ,GAMG-GaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes


Execution time per time step
(1.48732M cells, WALE ,GAMG-nonBlockingGaussSeidel)
Execution time per time step [s]
0
1
2
3
4
16
32
64
128
192
Number of MPI processes


Speedup ratio
(1.48732M cells, WALE ,GAMG-nonBlockingGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
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14
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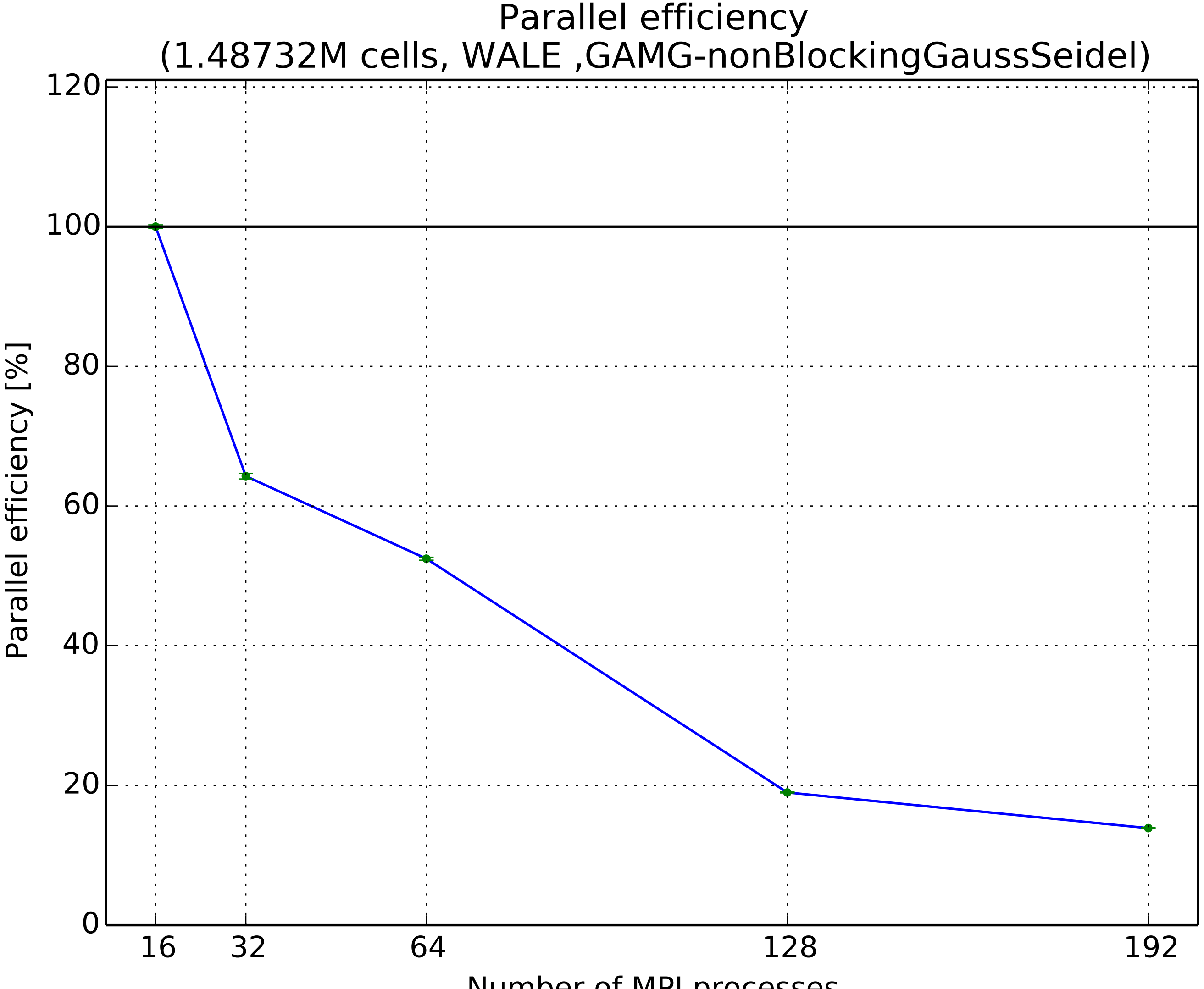
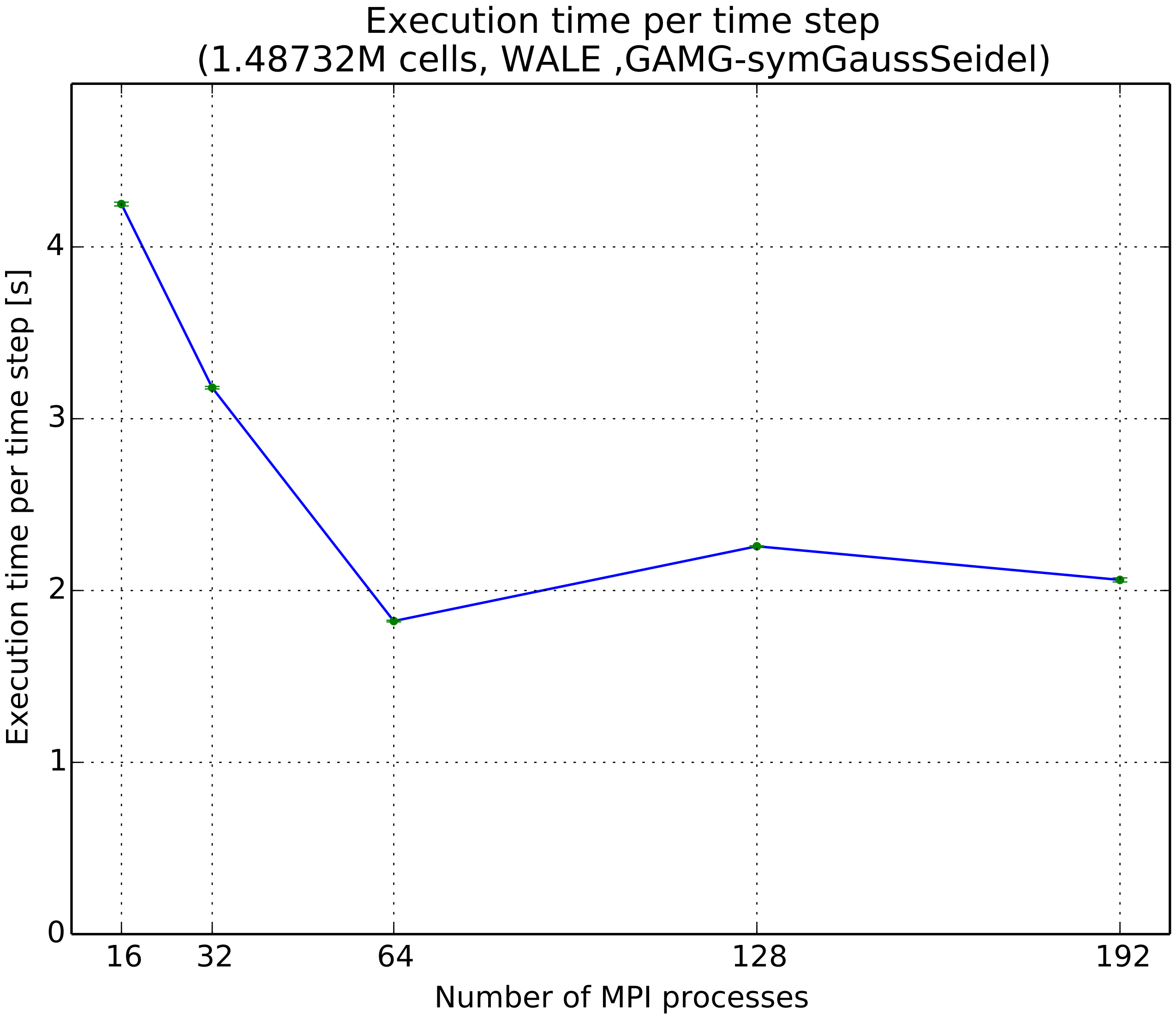
32
64
128
192
Number of MPI processes


Parallel efficiency
(1.48732M cells, WALE ,GAMG-nonBlockingGaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes


Execution time per time step
(1.48732M cells, WALE ,GAMG-symGaussSeidel)
Execution time per time step [s]
0
1
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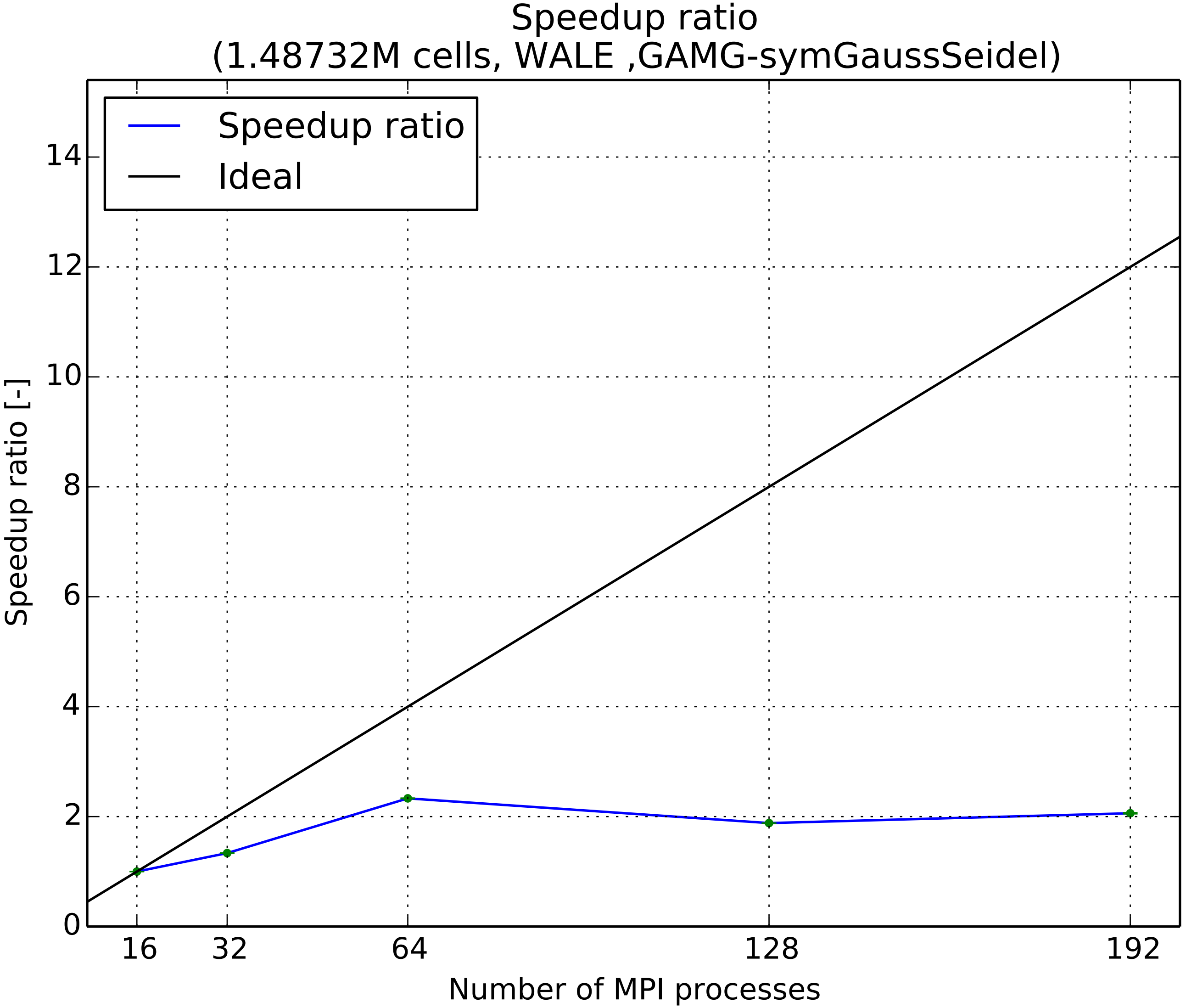
4
16
32
64
128
192
Number of MPI processes


Speedup ratio
(1.48732M cells, WALE ,GAMG-symGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
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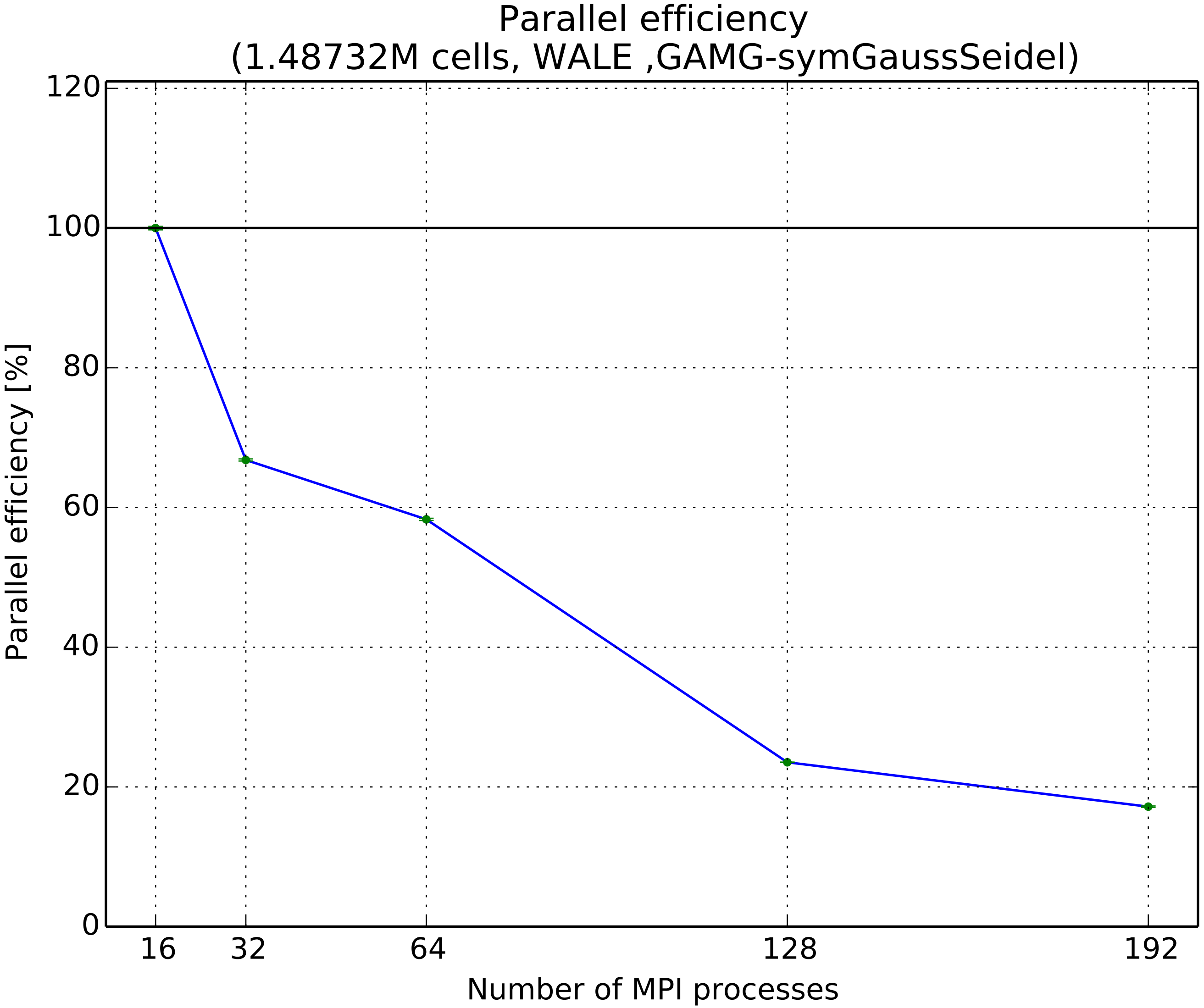
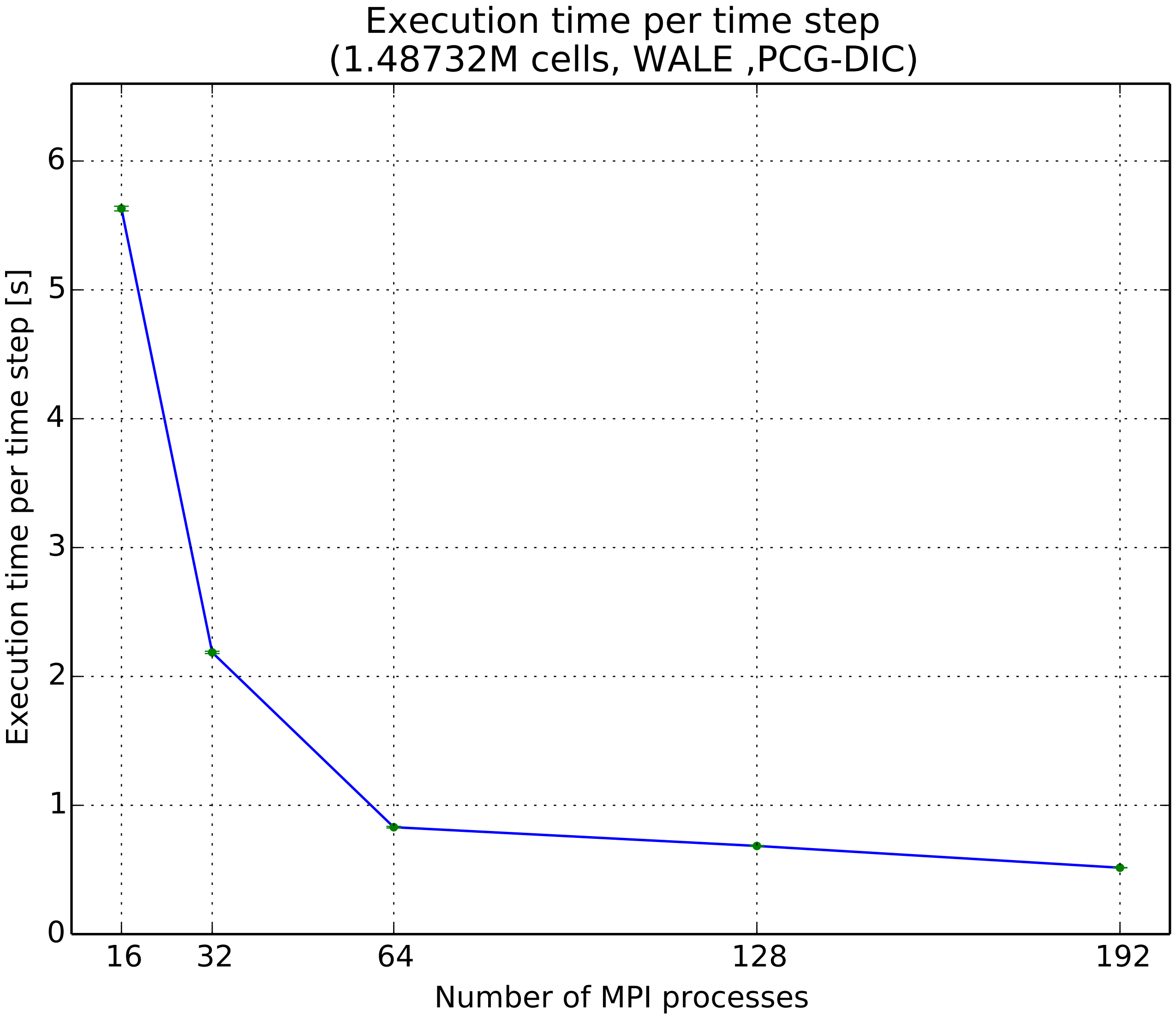
14
16
32
64
128
192
Number of MPI processes


Parallel efficiency
(1.48732M cells, WALE ,GAMG-symGaussSeidel)
Parallel efficiency [%]
120
100
80
60
40
20
0
16
32
64
128
192
Number of MPI processes


Execution time per time step
(1.48732M cells, WALE ,PCG-DIC)
Execution time per time step [s]
0
1
2
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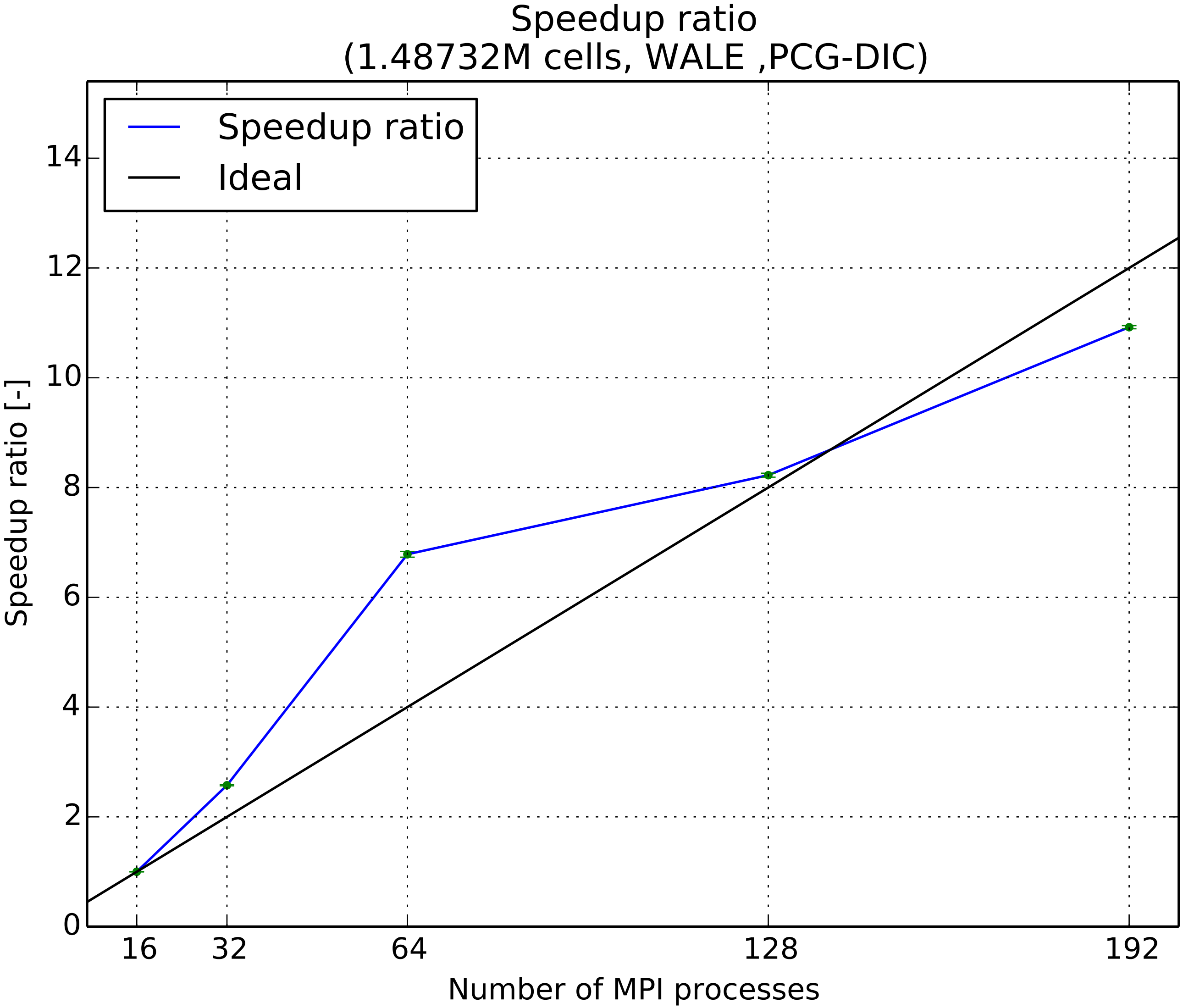
4
5
6
16
32
64
128
192
Number of MPI processes


Speedup ratio
(1.48732M cells, WALE ,PCG-DIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
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8
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14
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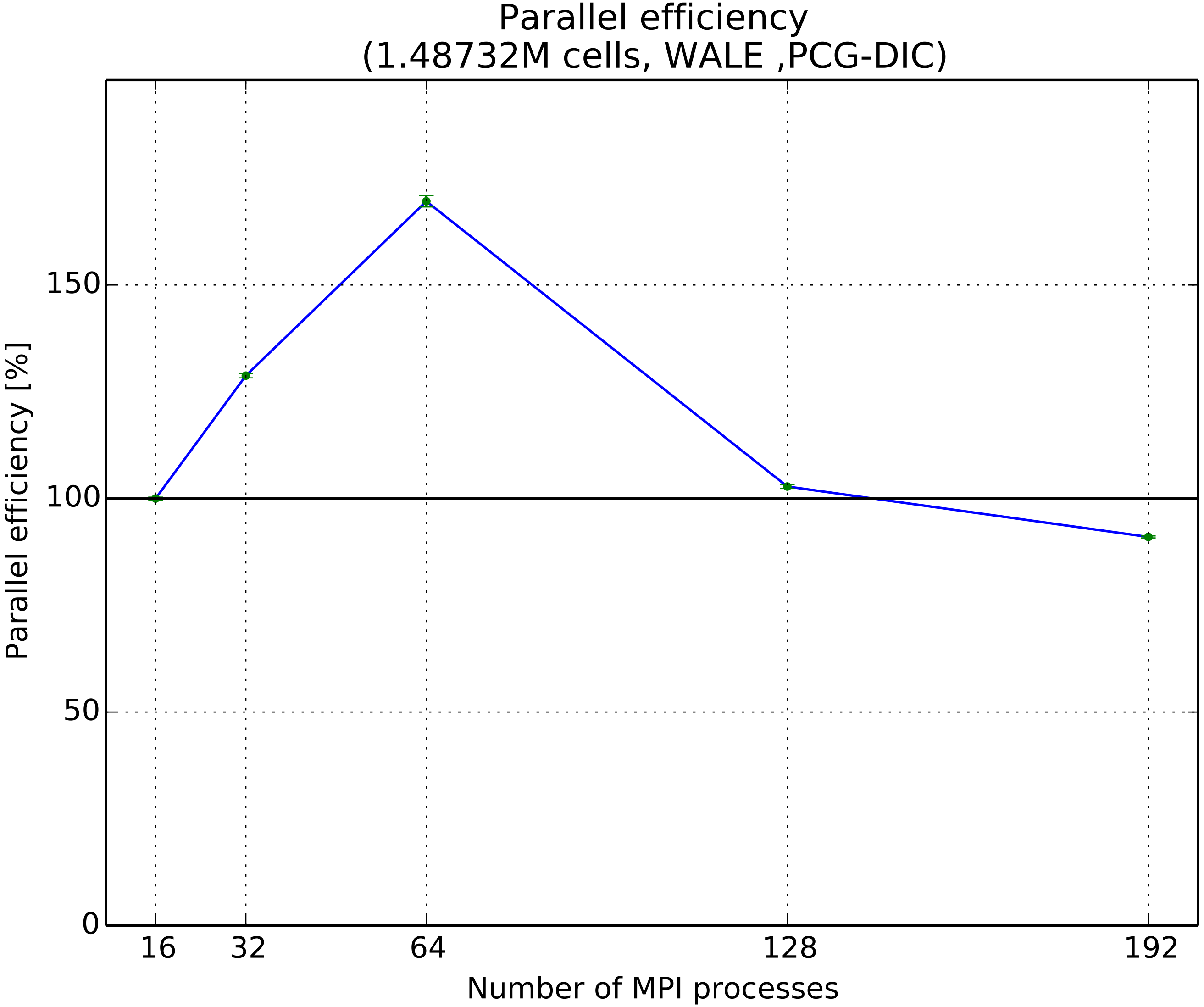
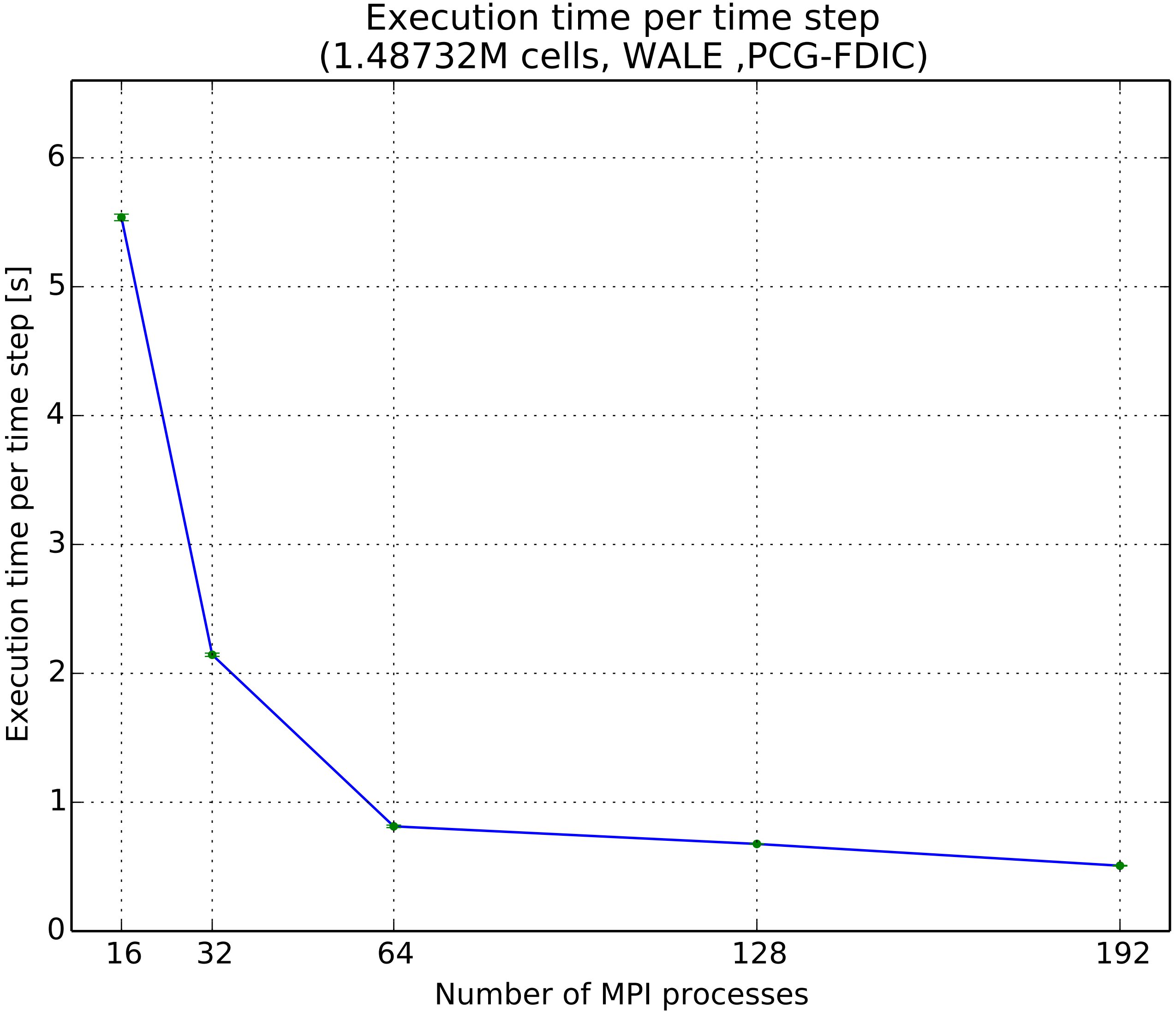
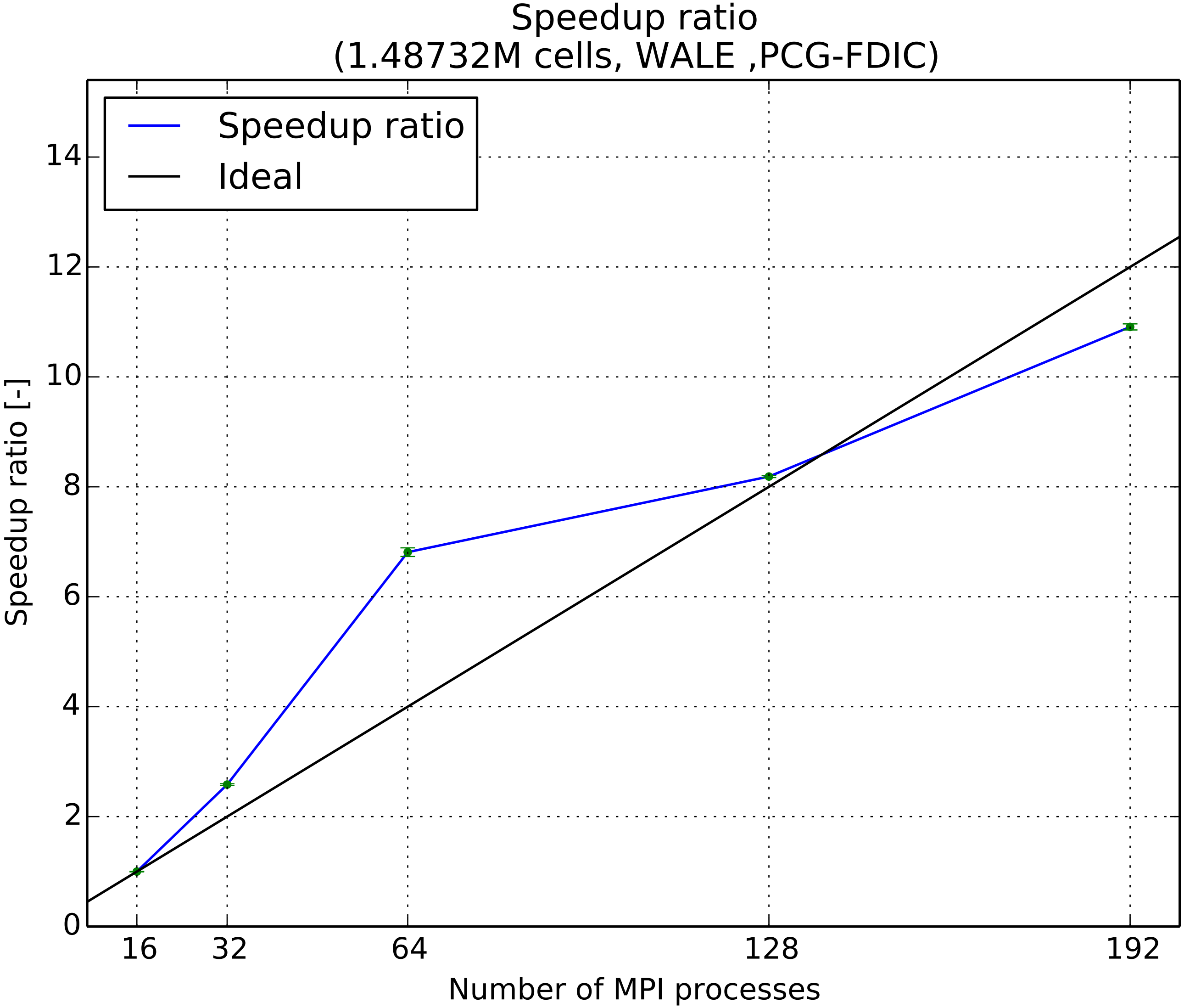
32
64
128
192
Number of MPI processes


Parallel efficiency
(1.48732M cells, WALE ,PCG-DIC)
Parallel efficiency [%]
0
50
100
150
16
32
64
128
192
Number of MPI processes


Execution time per time step
(1.48732M cells, WALE ,PCG-FDIC)
Execution time per time step [s]
0
1
2
3
4
5
6
16
32
64
128
192
Number of MPI processes


Speedup ratio
(1.48732M cells, WALE ,PCG-FDIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
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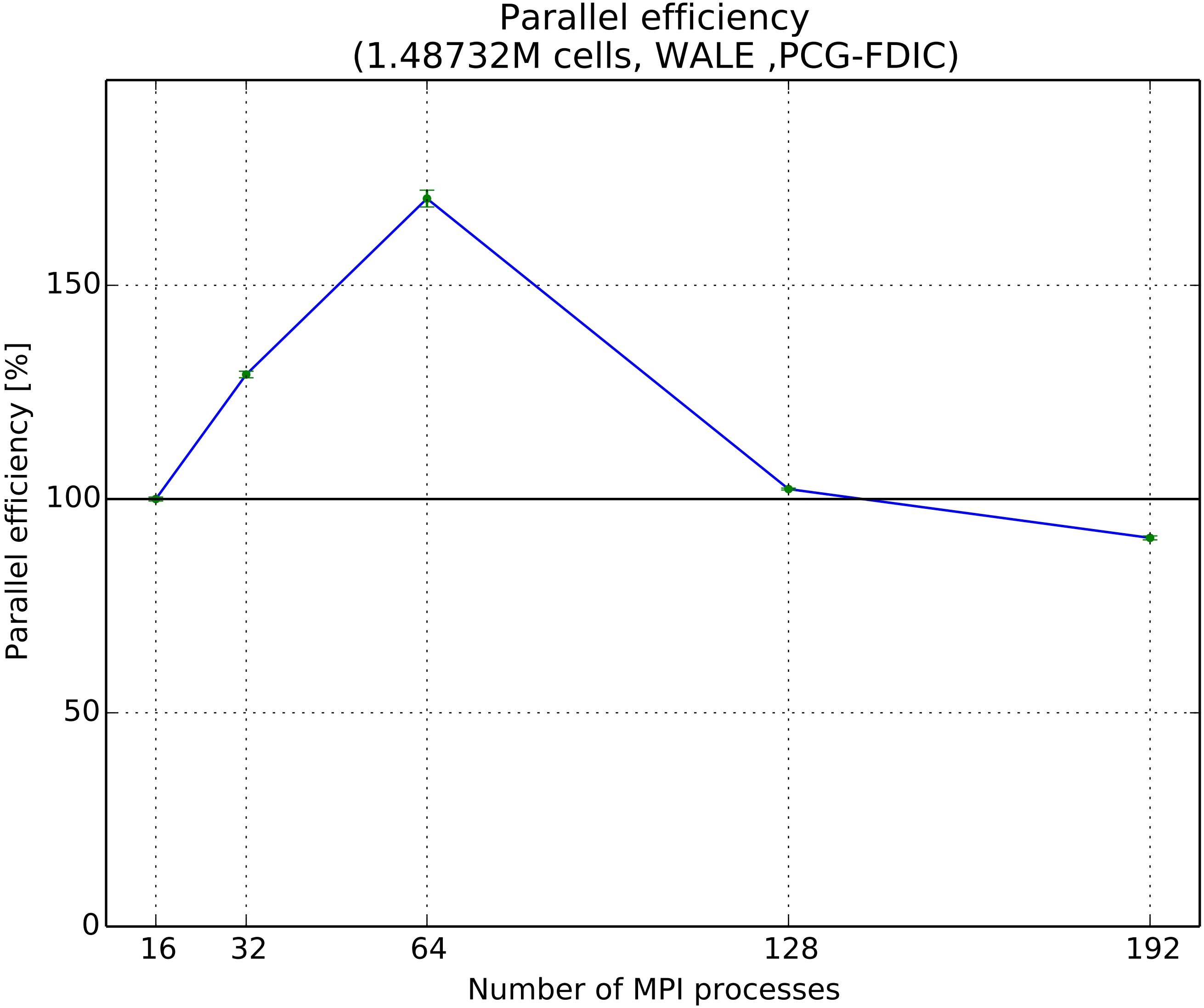
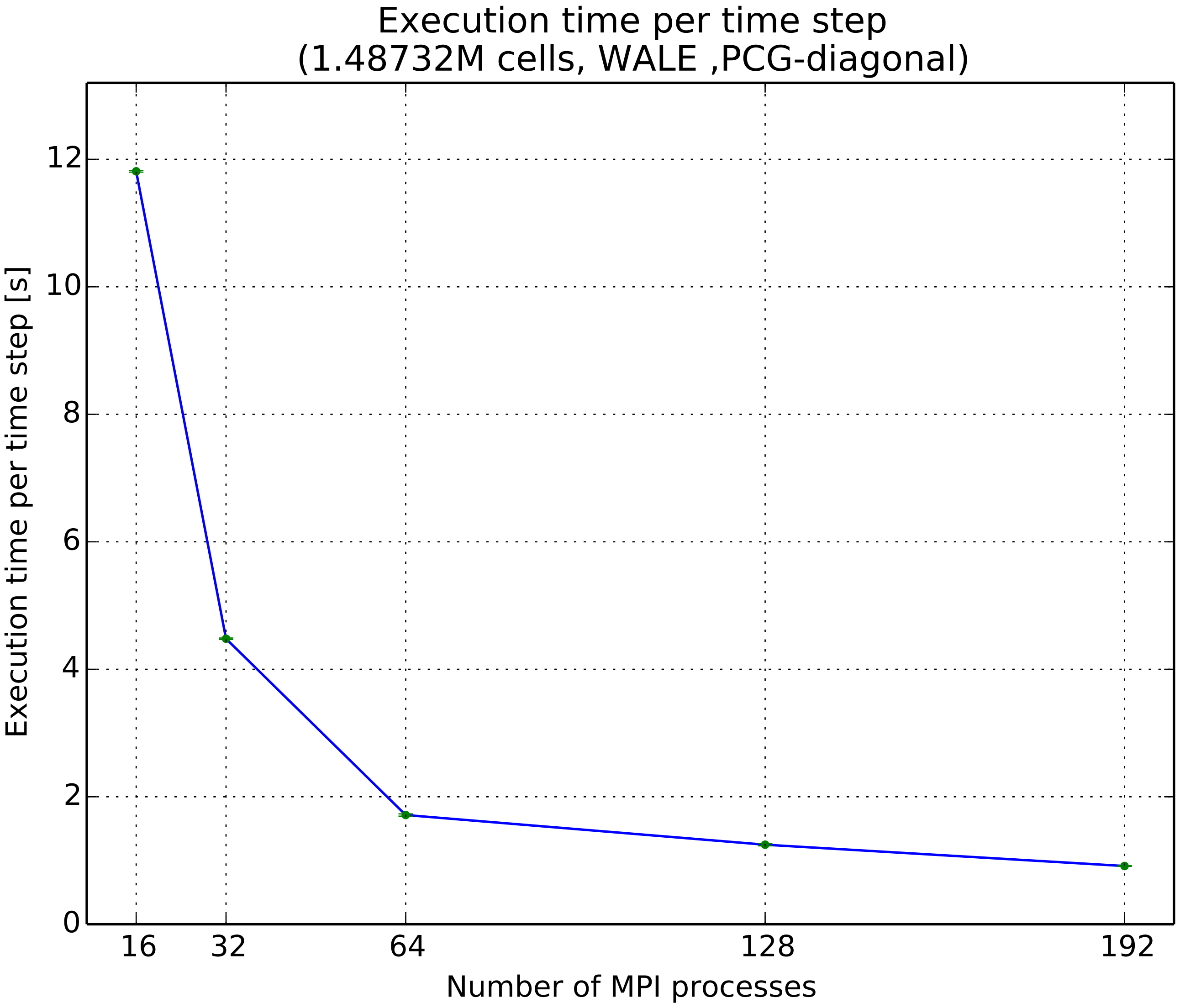
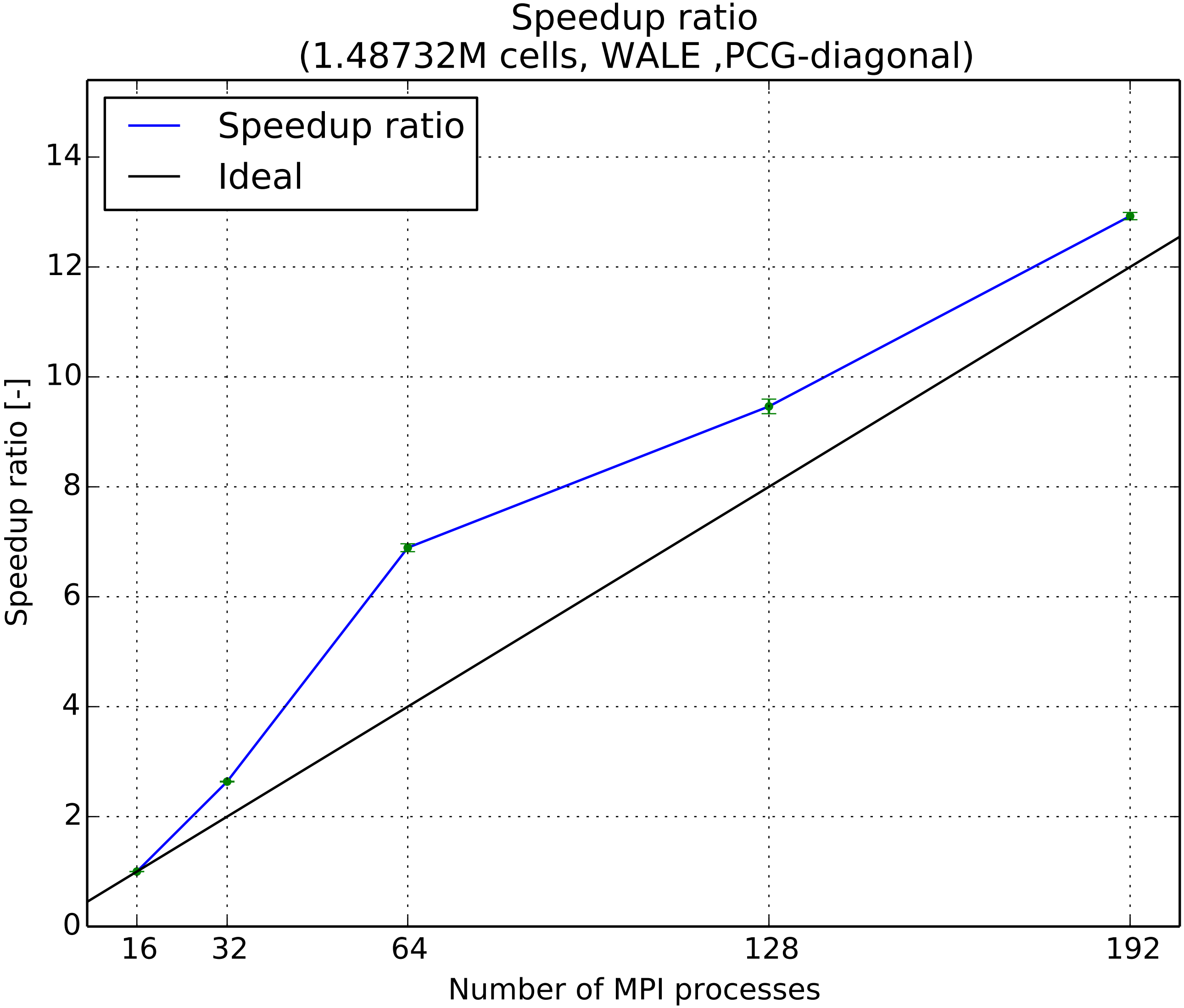
14
16
32
64
128
192
Number of MPI processes


Parallel efficiency
(1.48732M cells, WALE ,PCG-FDIC)
Parallel efficiency [%]
150
100
50
0
16
32
64
128
192
Number of MPI processes


Execution time per time step
(1.48732M cells, WALE ,PCG-diagonal)
Execution time per time step [s]
0
2
4
6
8
10
12
16
32
64
128
192
Number of MPI processes


Speedup ratio
(1.48732M cells, WALE ,PCG-diagonal)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
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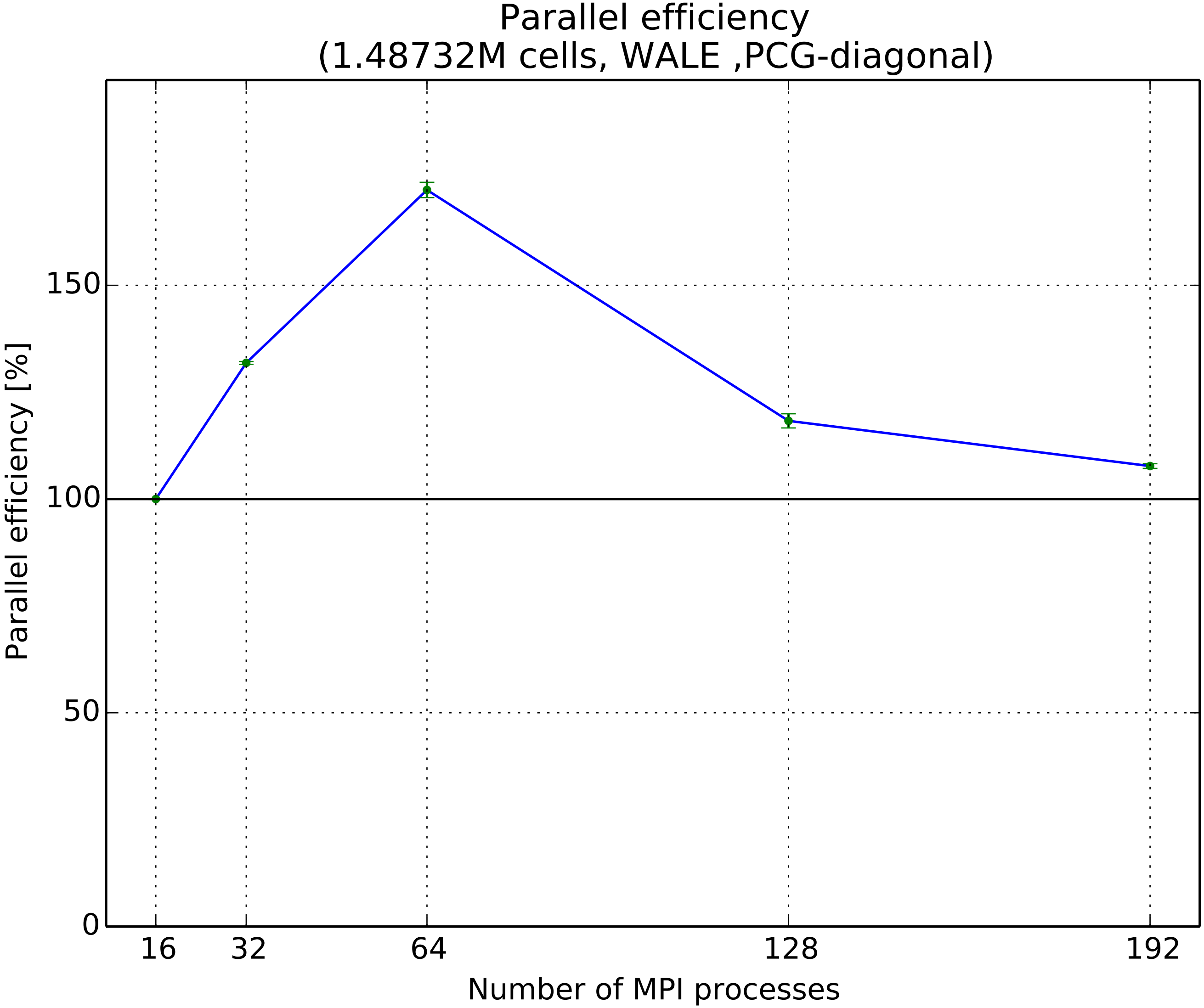
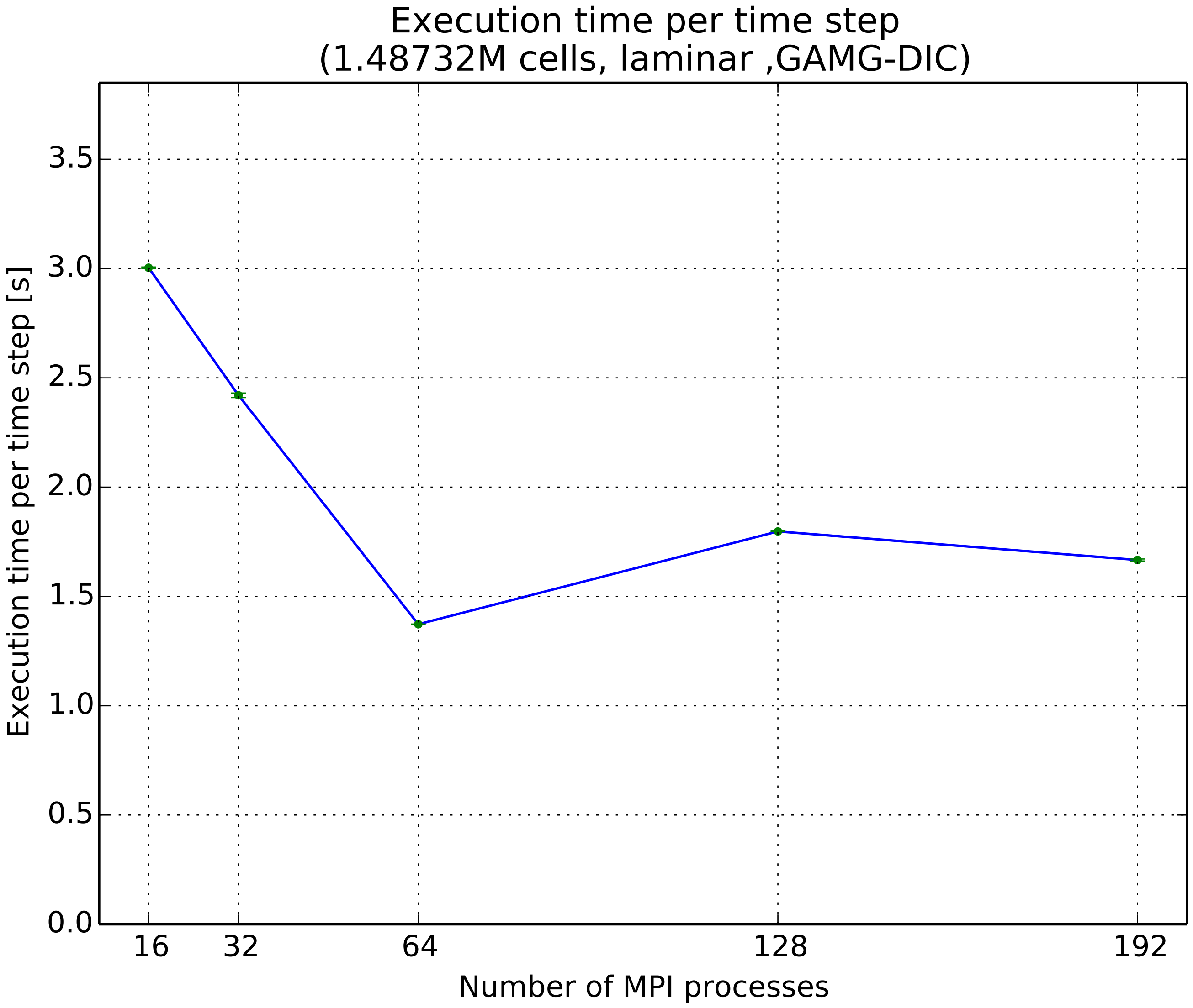
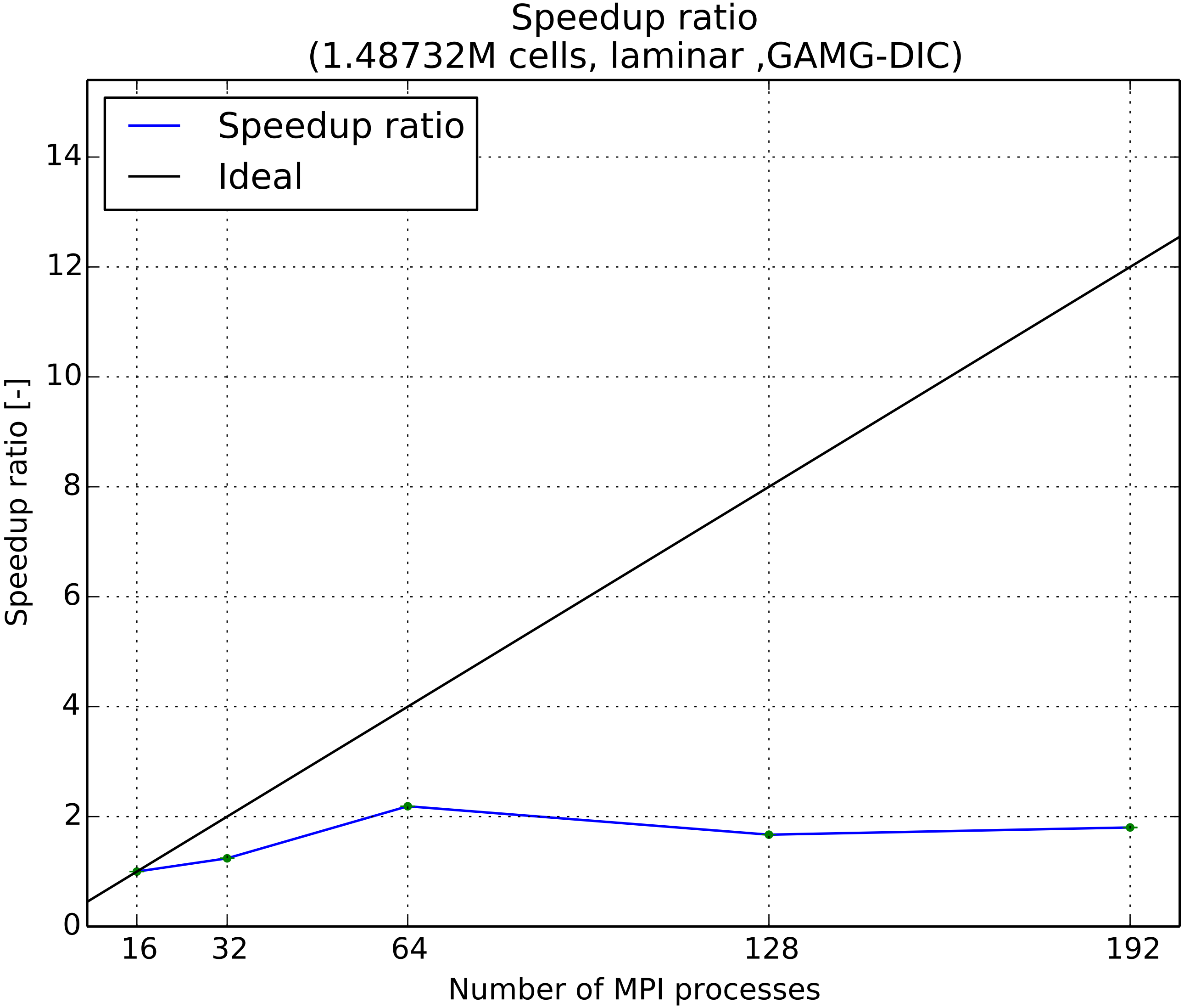
14
16
32
64
128
192
Number of MPI processes


Parallel efficiency
(1.48732M cells, WALE ,PCG-diagonal)
Parallel efficiency [%]
0
50
100
150
16
32
64
128
192
Number of MPI processes


Execution time per time step
(1.48732M cells, laminar ,GAMG-DIC)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
16
32
64
128
192
Number of MPI processes


Speedup ratio
(1.48732M cells, laminar ,GAMG-DIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
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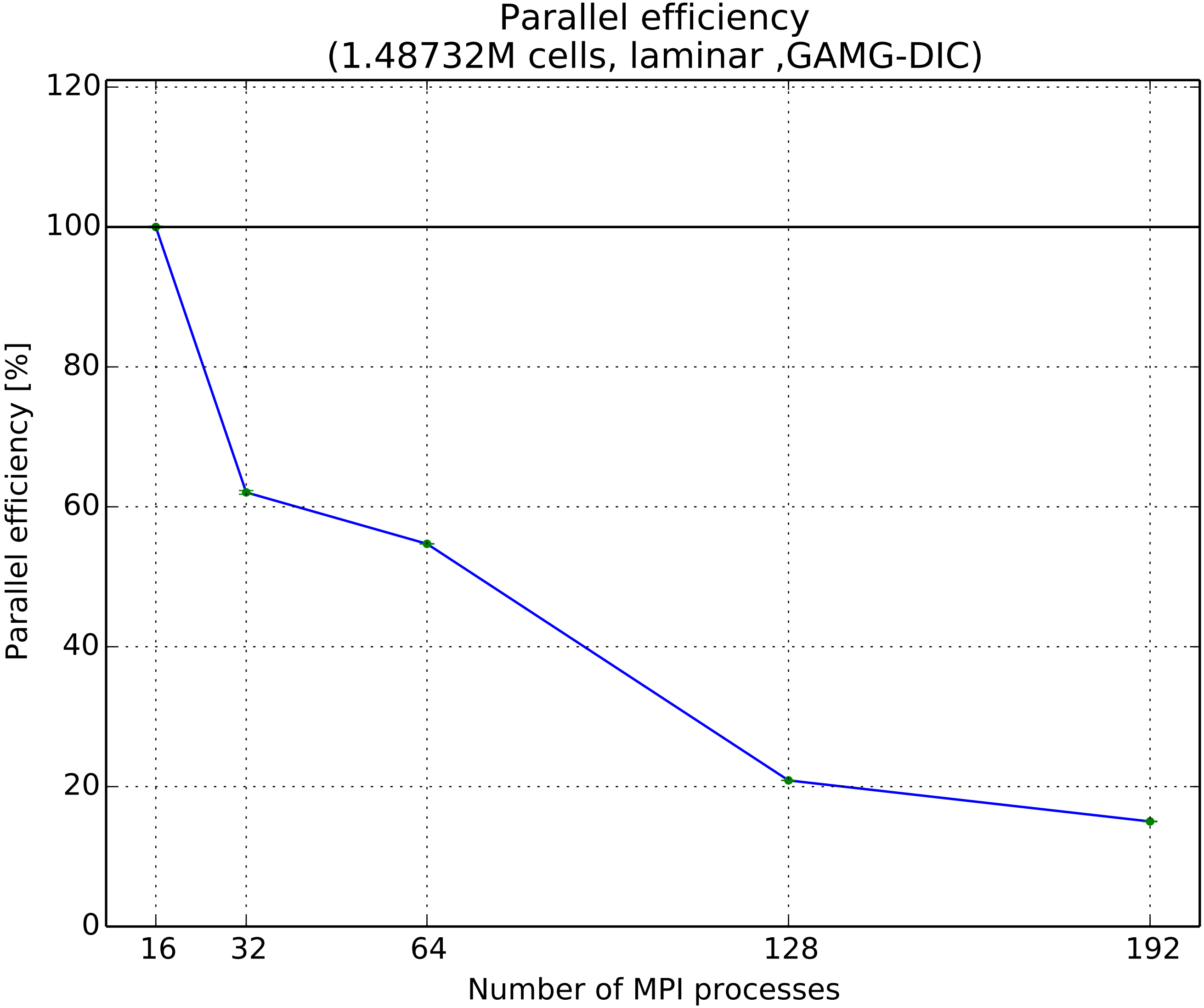
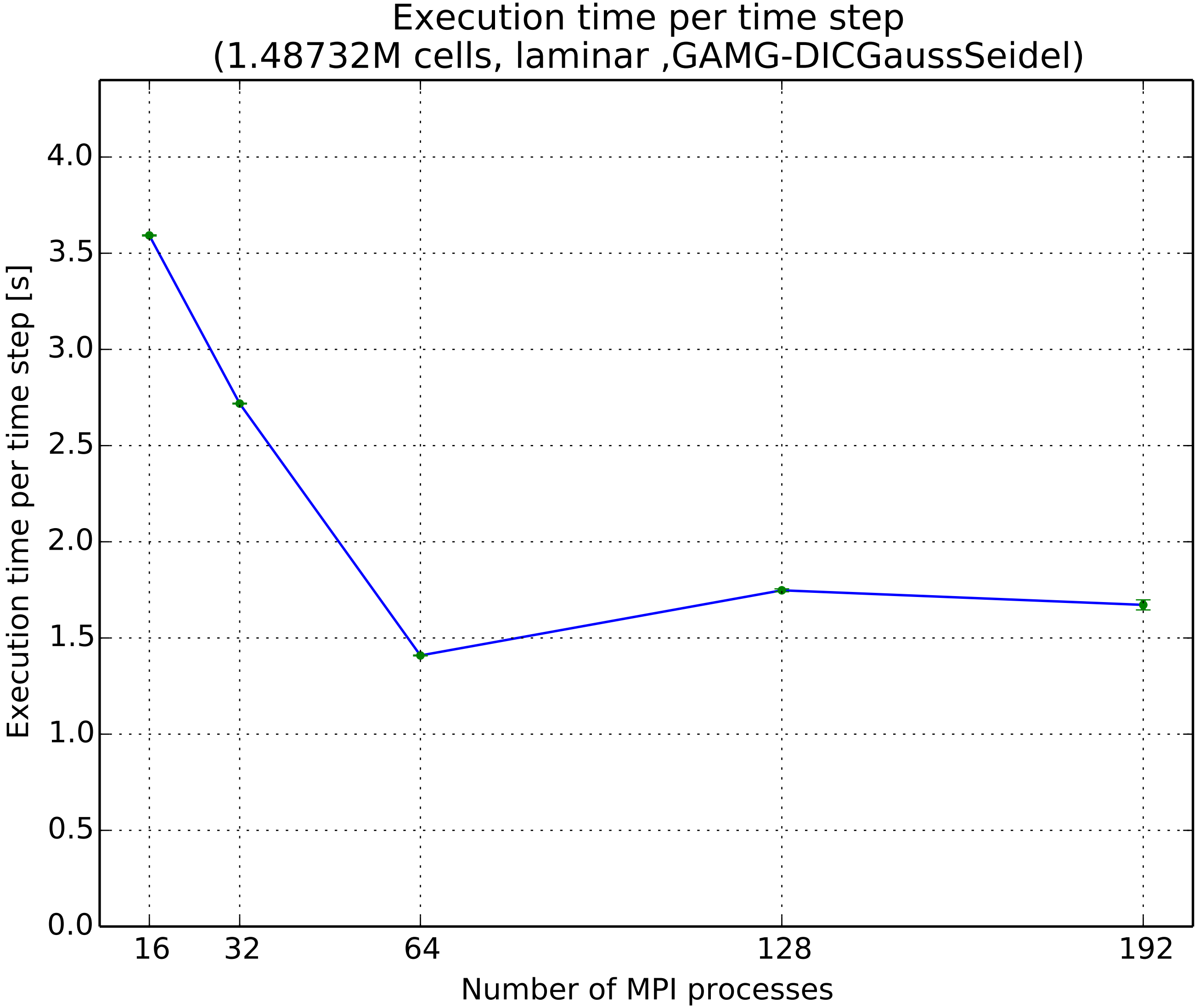
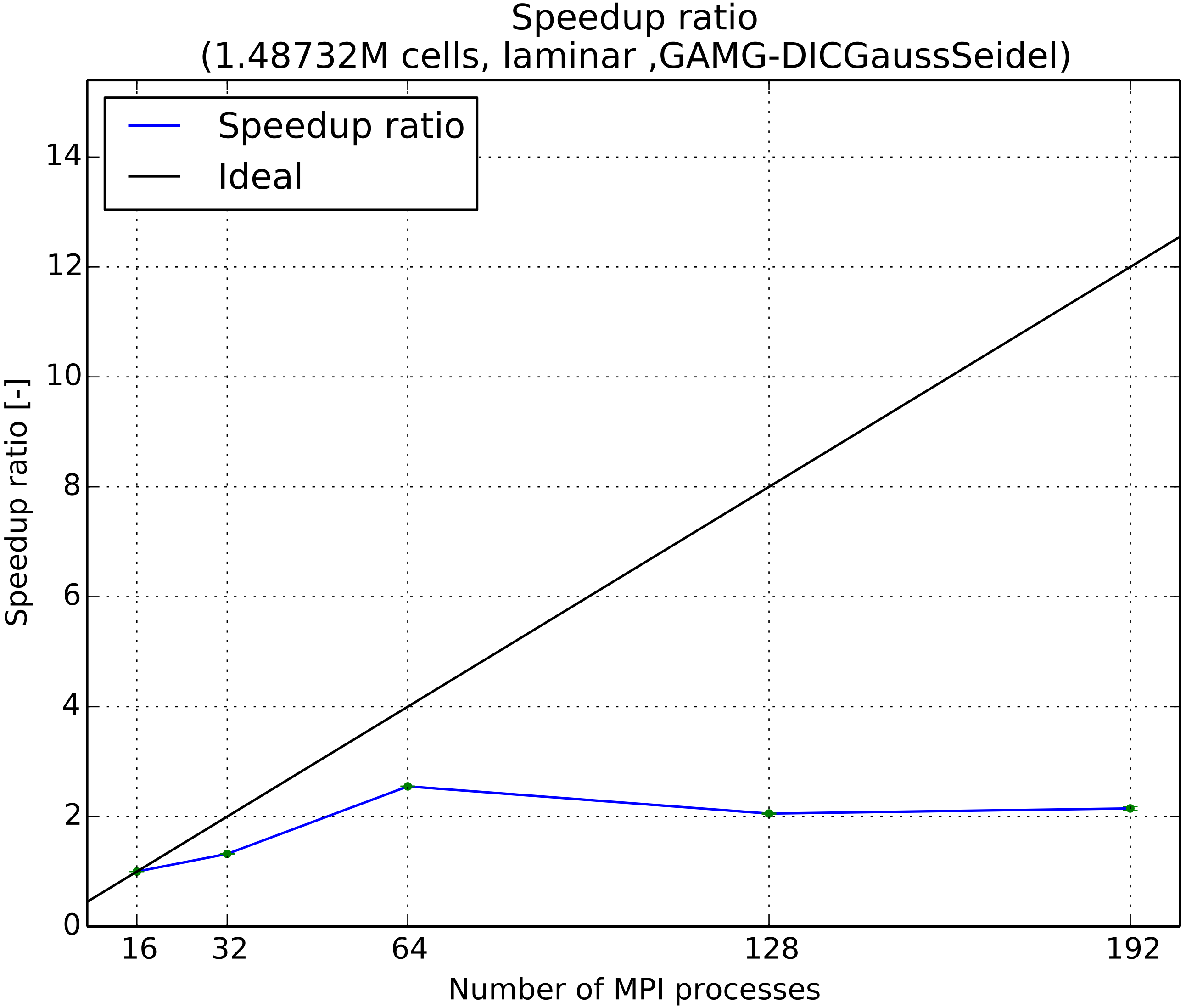
64
128
192
Number of MPI processes


Parallel efficiency
(1.48732M cells, laminar ,GAMG-DIC)
Parallel efficiency [%]
Number of MPI processes
0
20
40
60
80
100
120
16
32
64
128
192


Execution time per time step
(1.48732M cells, laminar ,GAMG-DICGaussSeidel)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
16
32
64
128
192
Number of MPI processes


Speedup ratio
(1.48732M cells, laminar ,GAMG-DICGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
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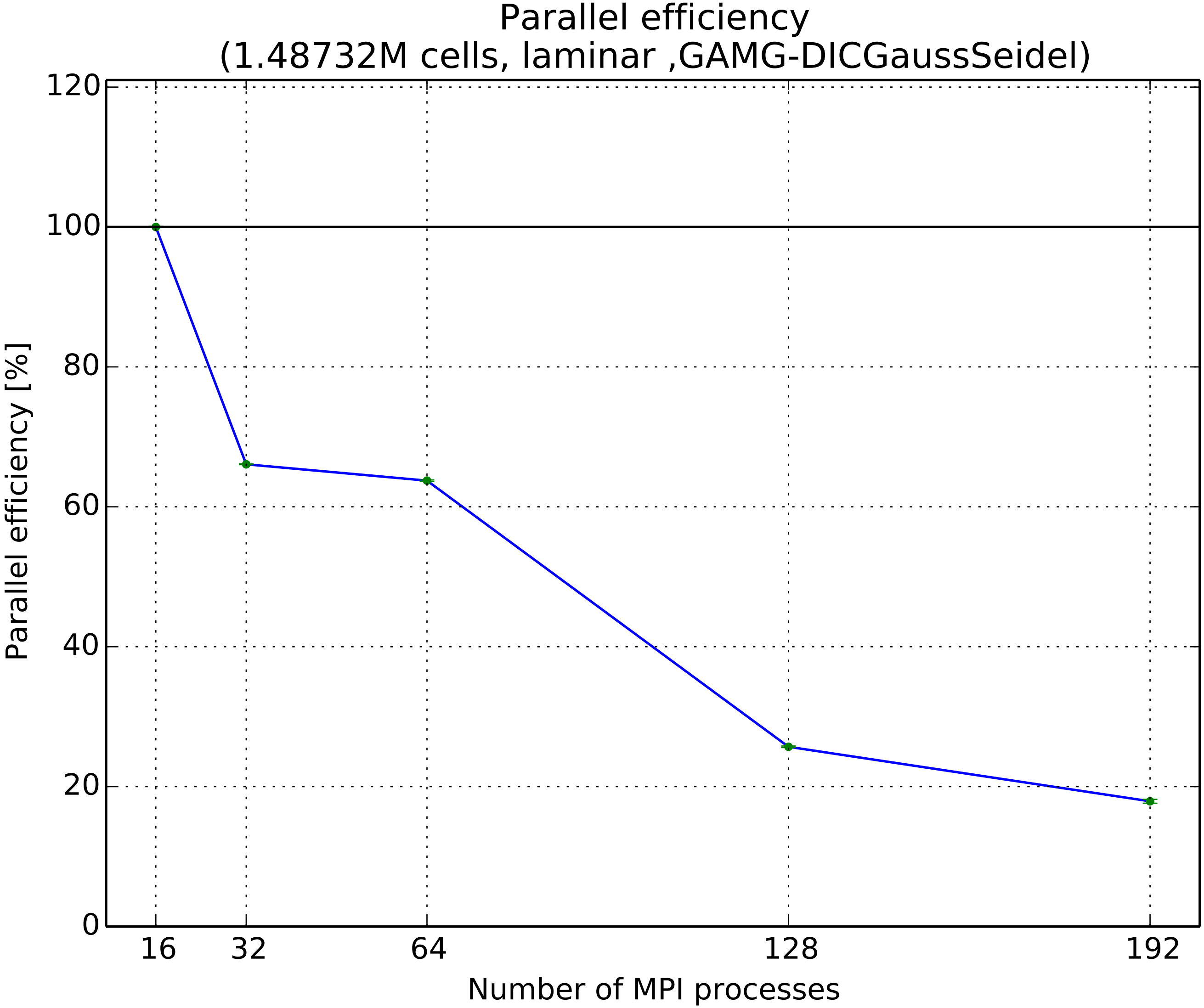
14
16
32
64
128
192
Number of MPI processes


Parallel efficiency
(1.48732M cells, laminar ,GAMG-DICGaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
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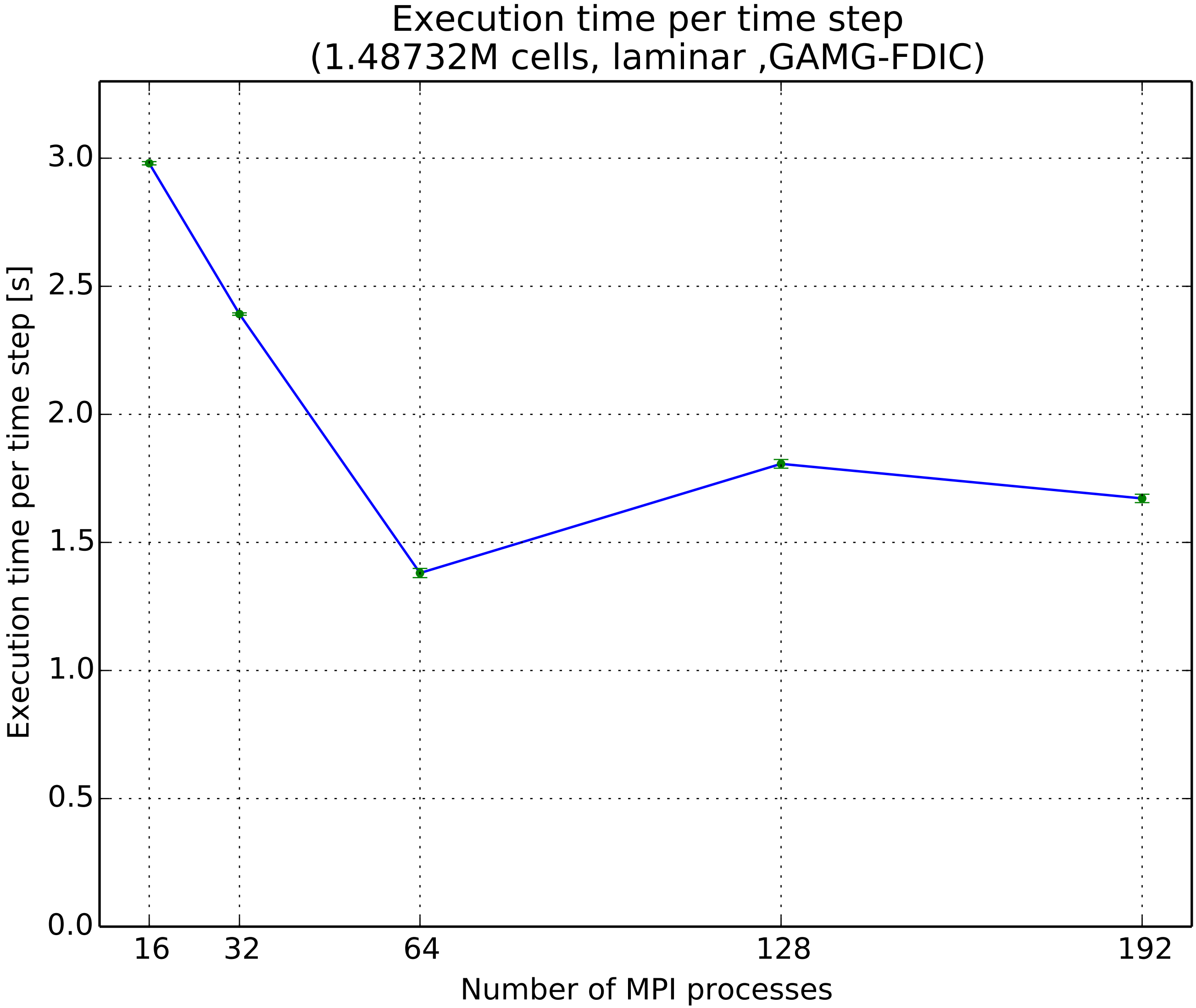
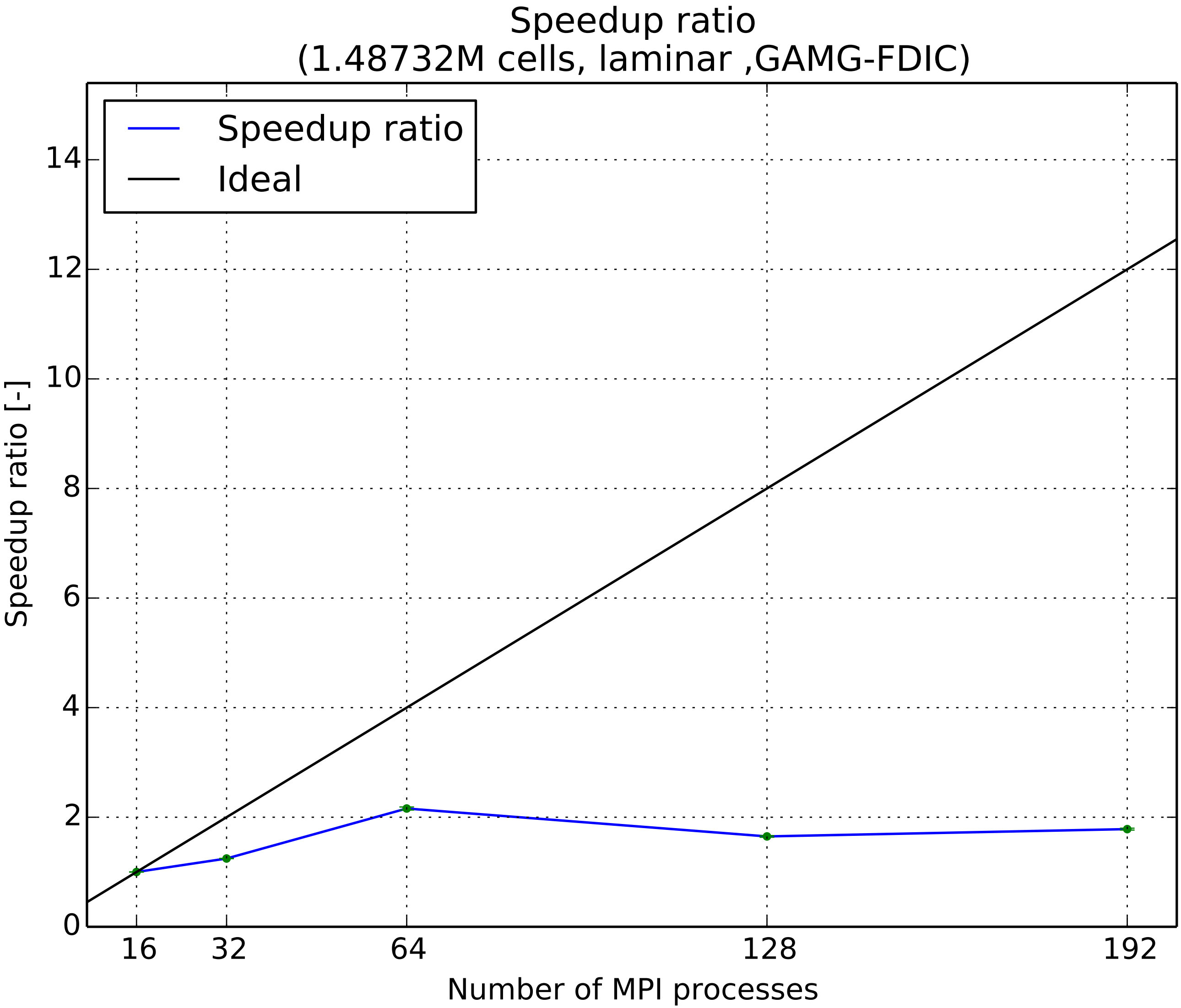
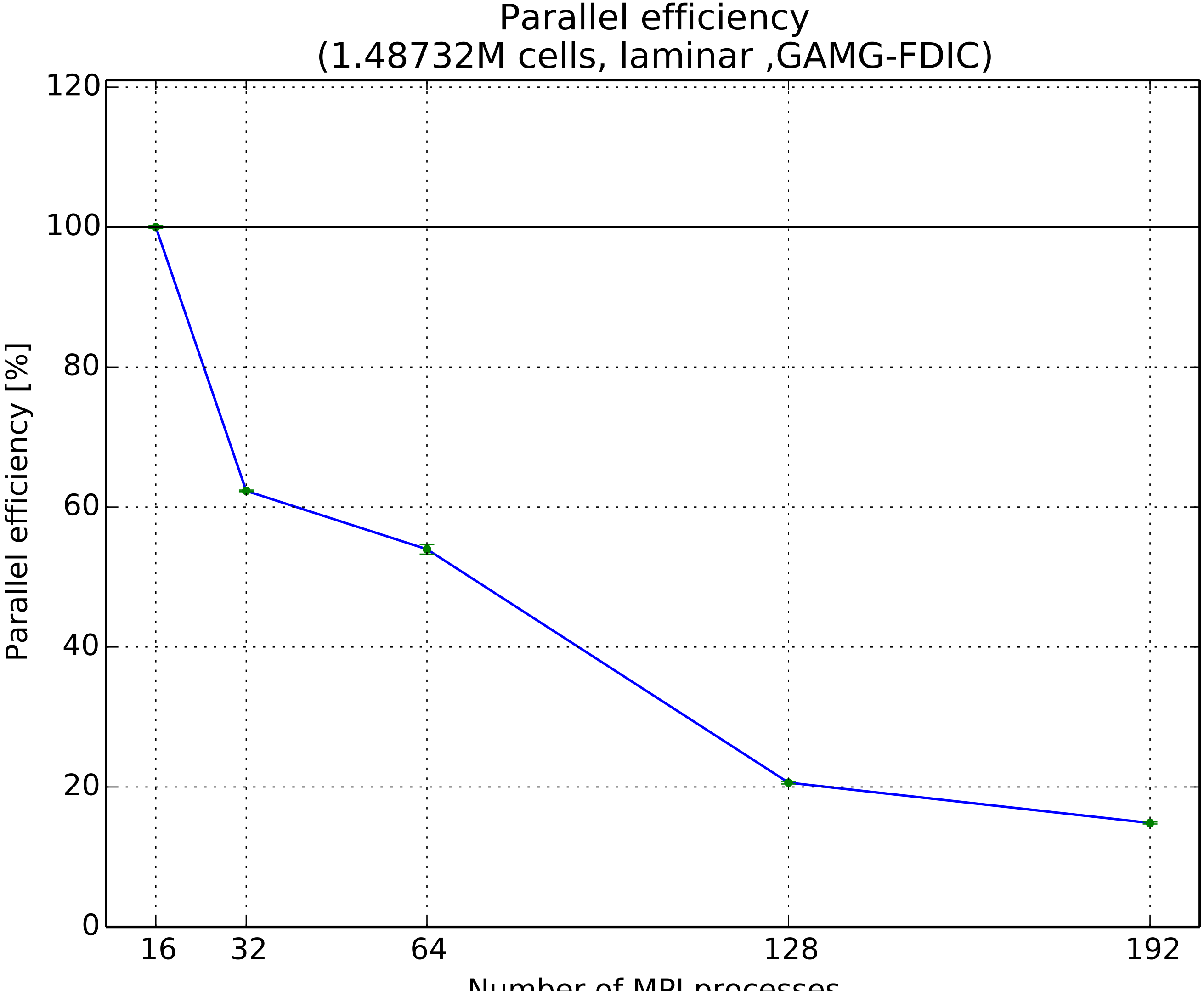
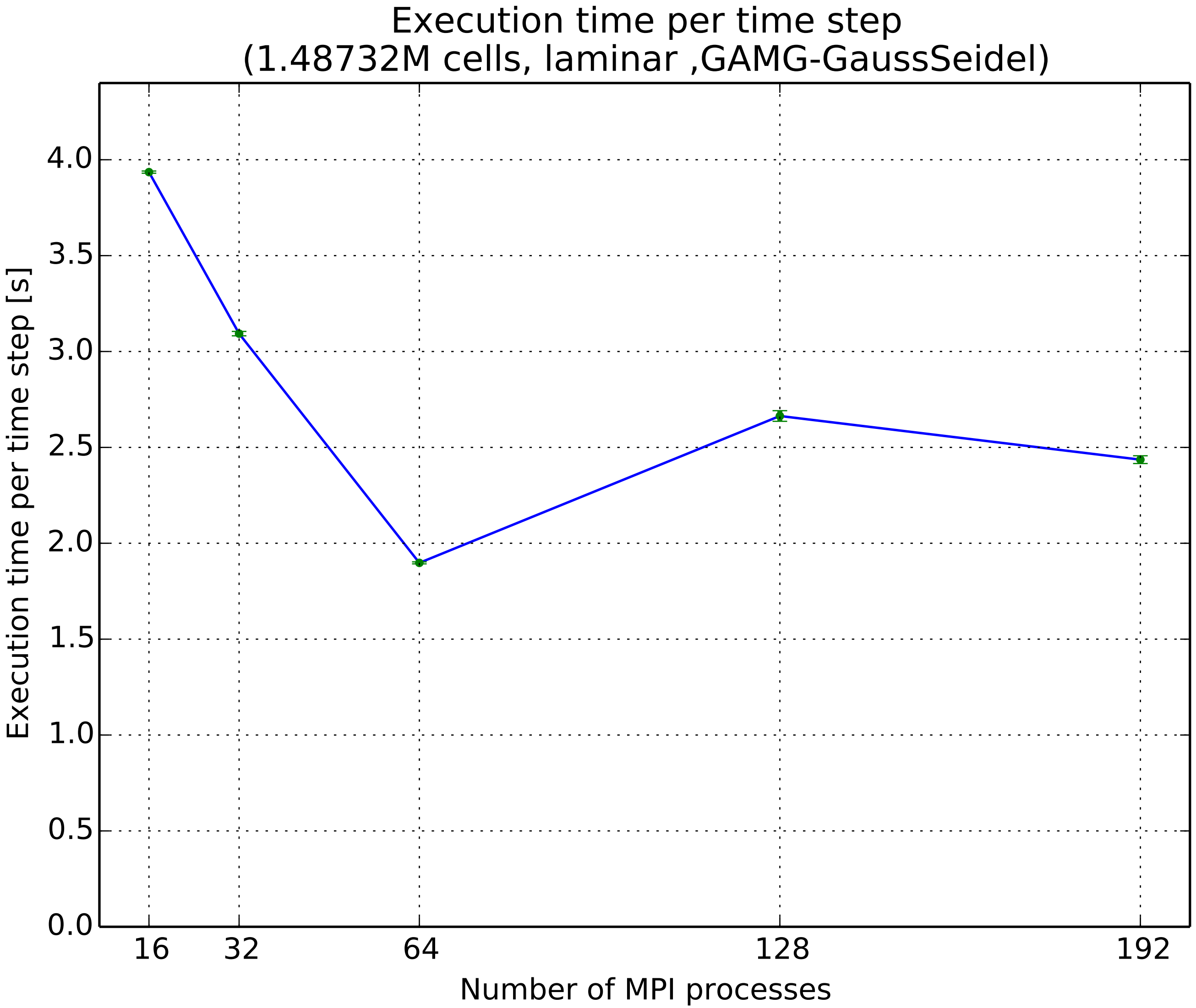
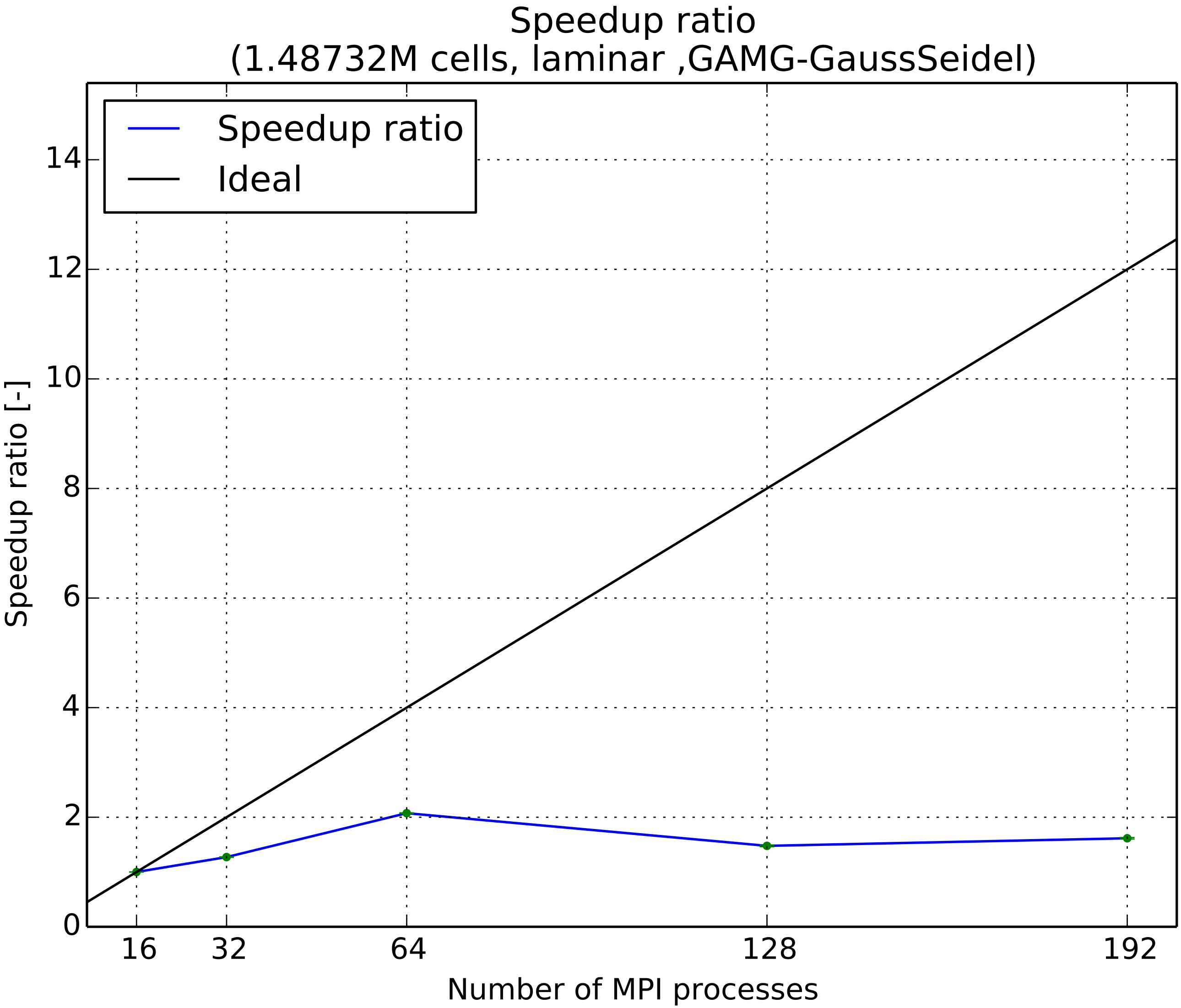
32
64
128
192
Number of MPI processes

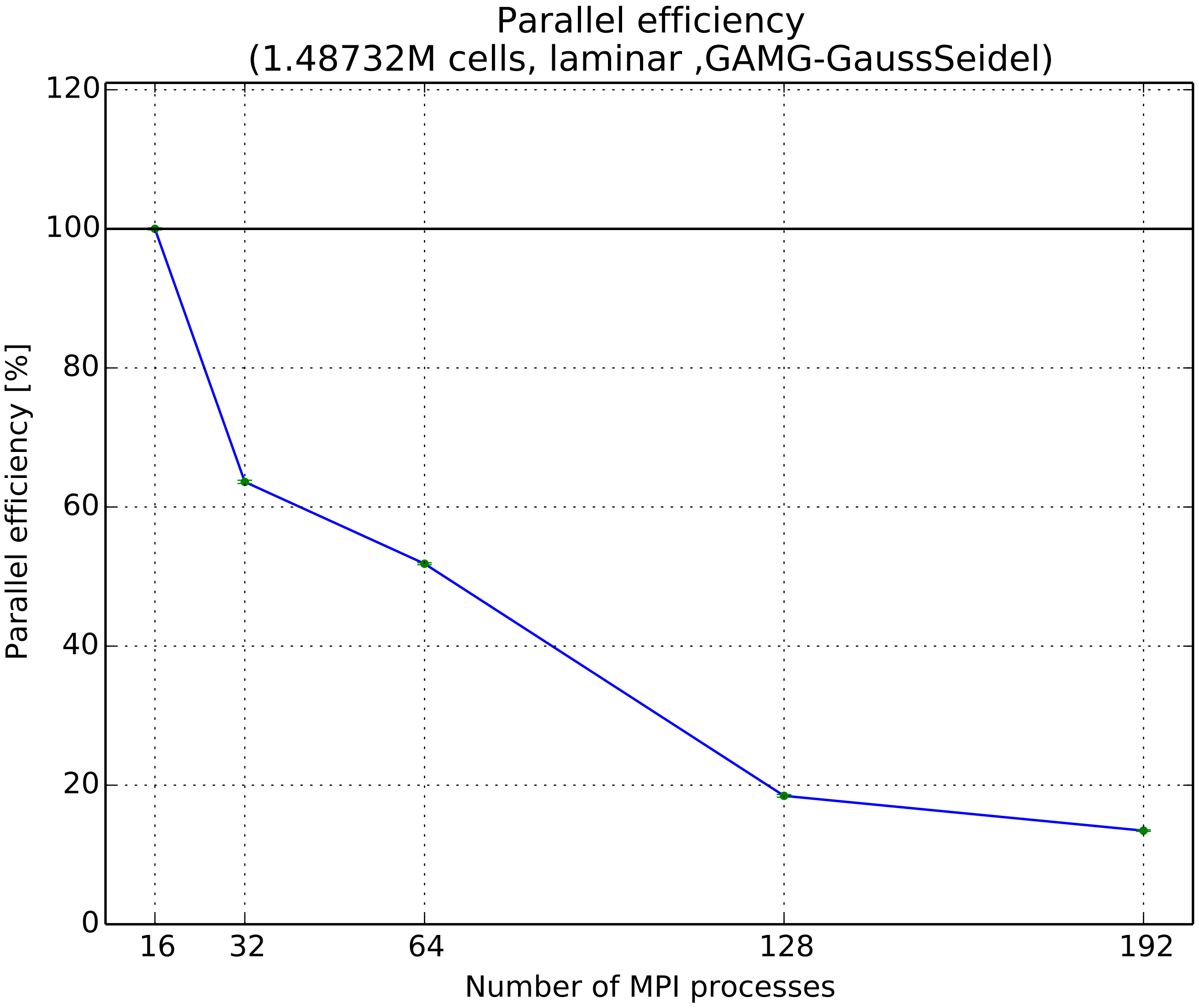

Execution time per time step
(1.48732M cells, laminar ,GAMG-FDIC)
Execution time per time step [s]
3.0
2.5
2.0
1.5
1.0
0.5
0.0
16
32
64
128
192
Number of MPI processes

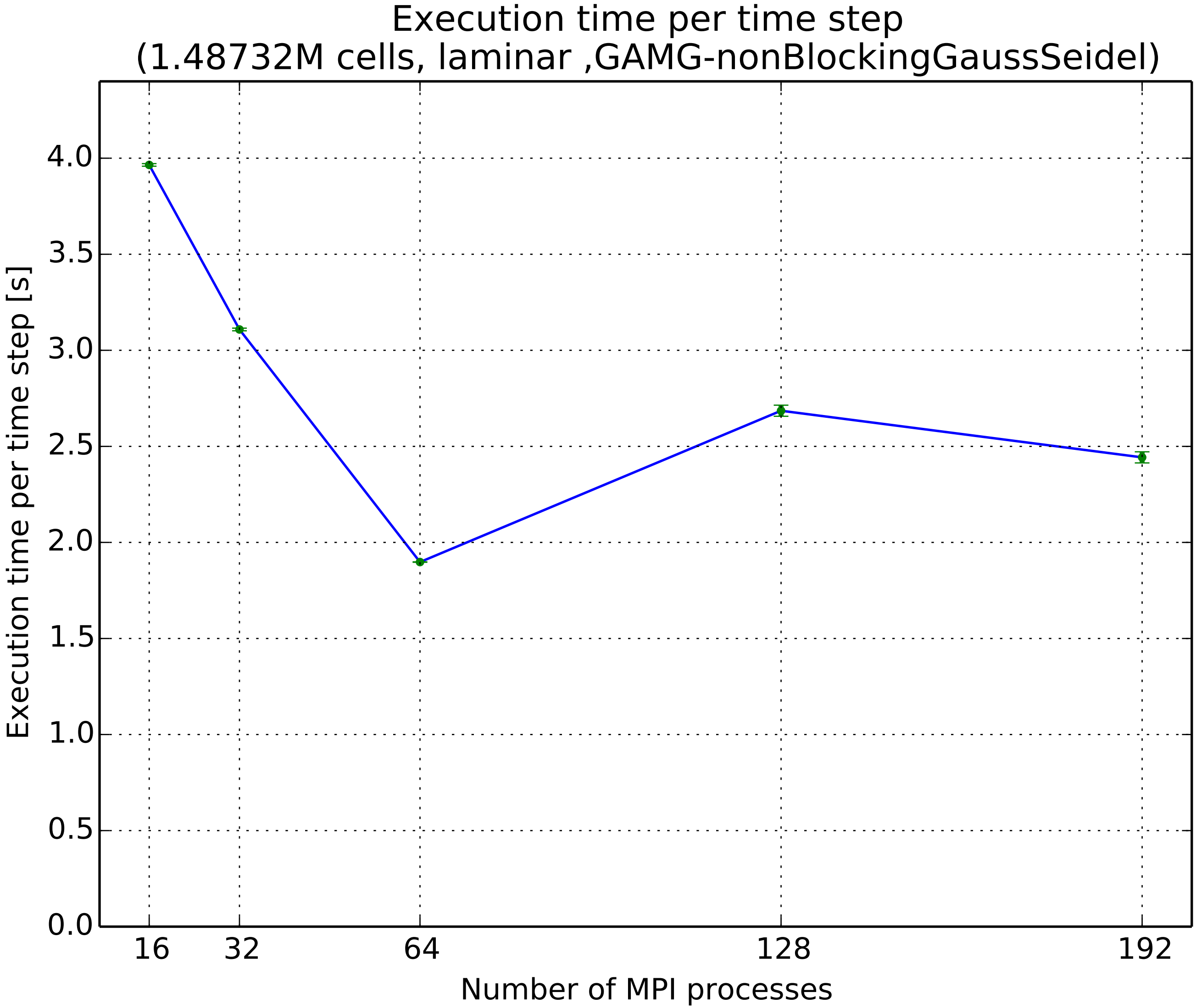

Speedup ratio
(1.48732M cells, laminar ,GAMG-FDIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

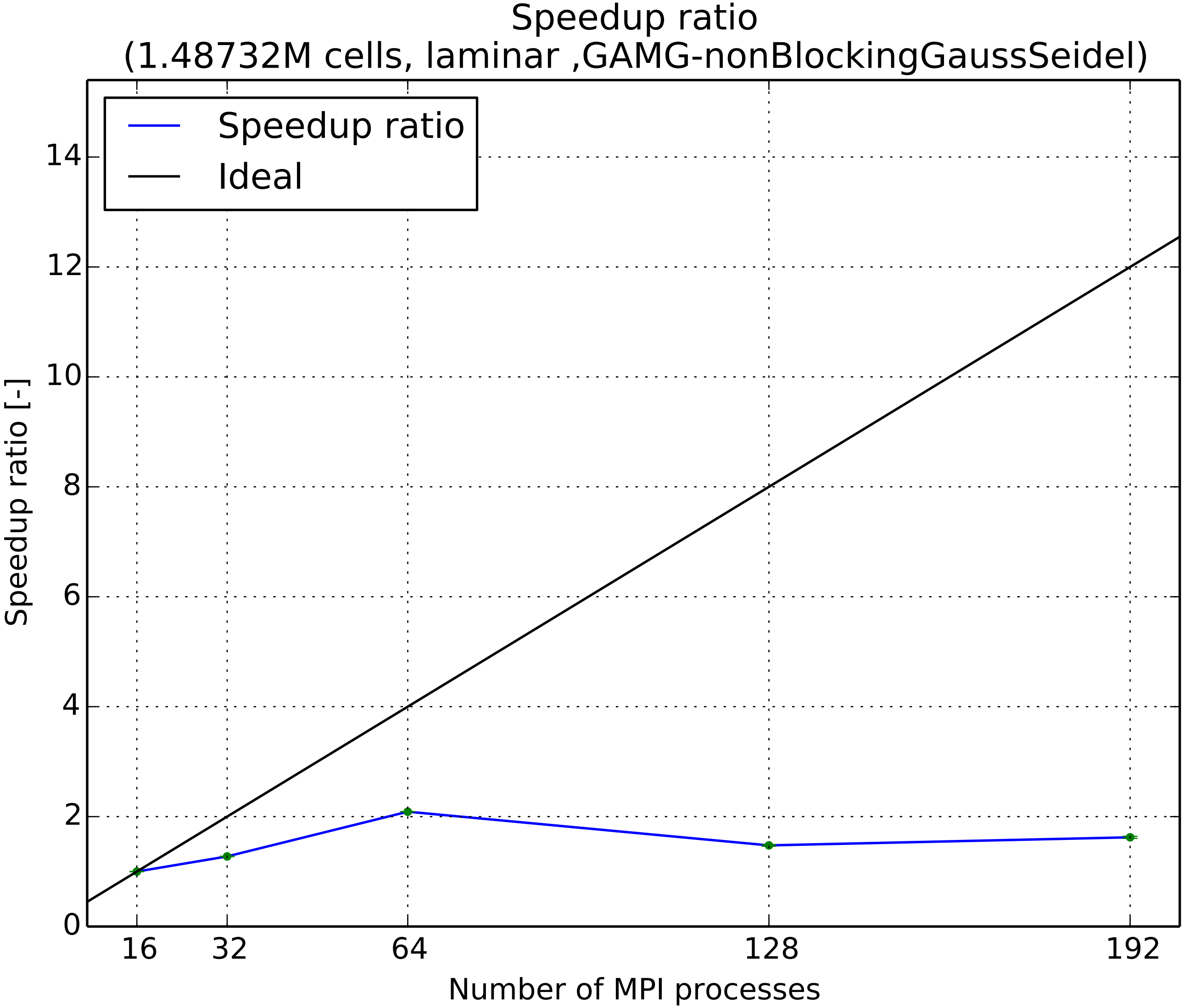

Parallel efficiency
(1.48732M cells, laminar ,GAMG-FDIC)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes


Execution time per time step
(1.48732M cells, laminar ,GAMG-GaussSeidel)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
16
32
64
128
192
Number of MPI processes


Speedup ratio
(1.48732M cells, laminar ,GAMG-GaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes


Parallel efficiency
(1.48732M cells, laminar ,GAMG-GaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes


Execution time per time step
(1.48732M cells, laminar ,GAMG-nonBlockingGaussSeidel)
Execution time per time step [s]
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
16
32
64
128
192
Number of MPI processes


Speedup ratio
(1.48732M cells, laminar ,GAMG-nonBlockingGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
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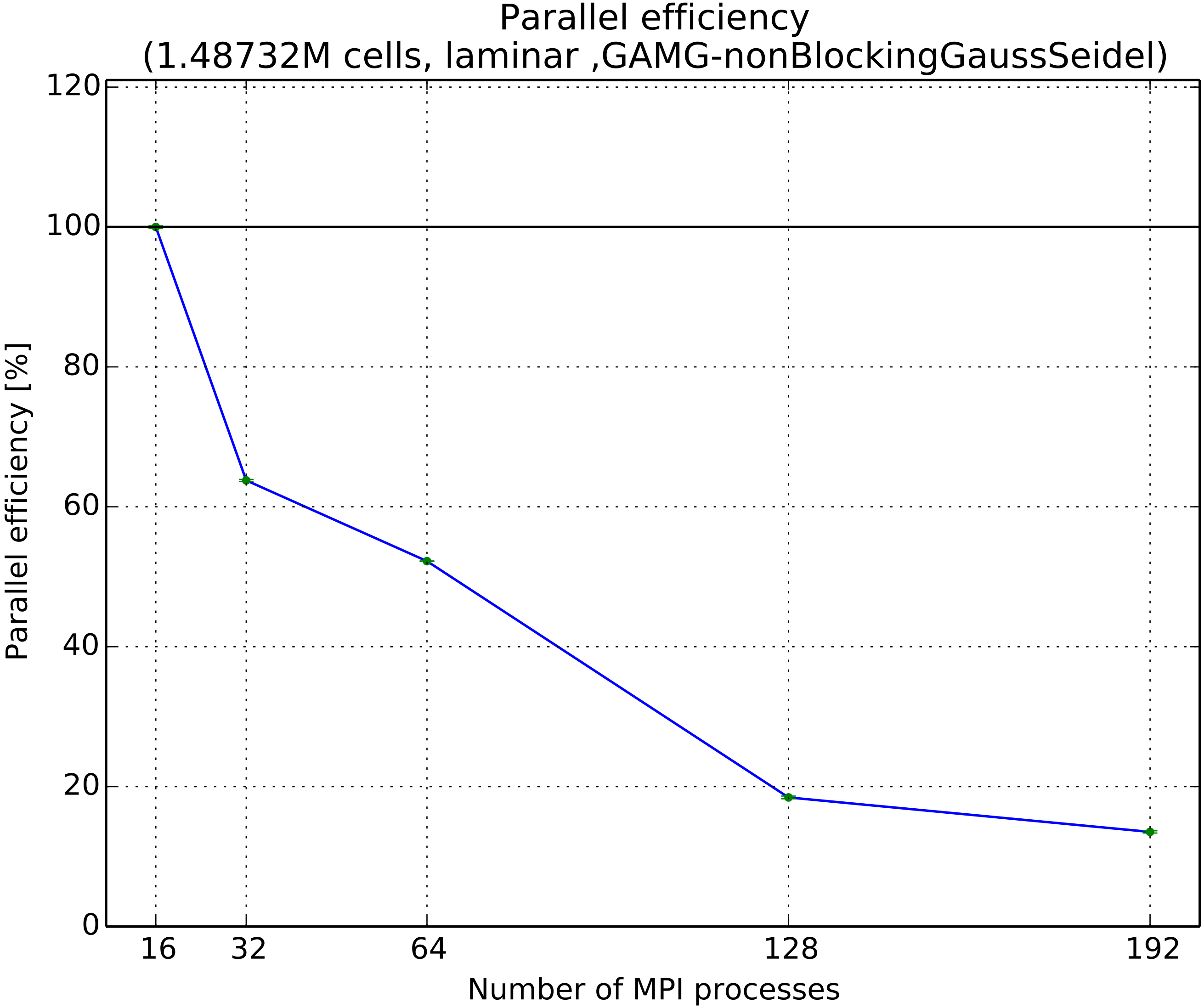
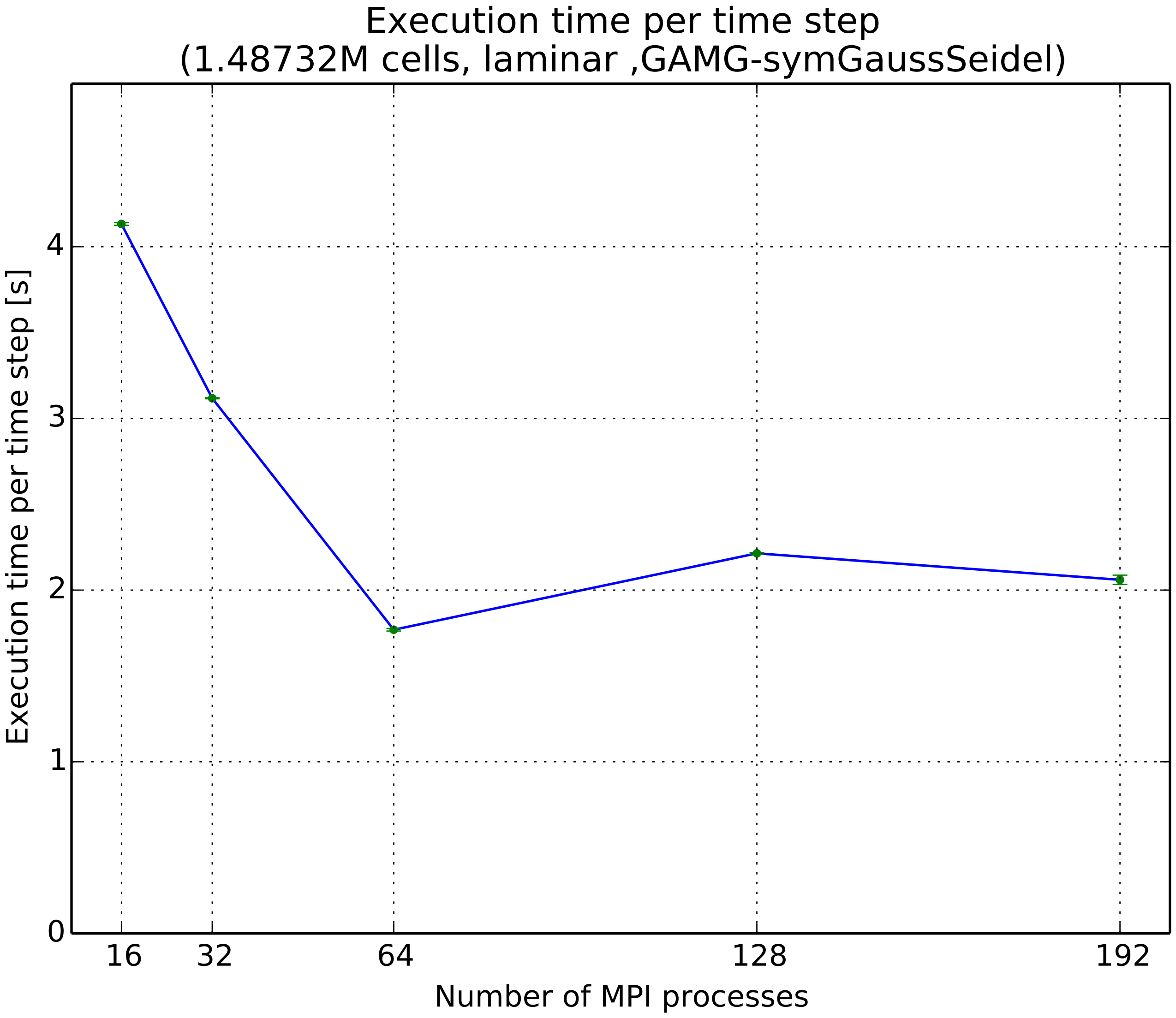
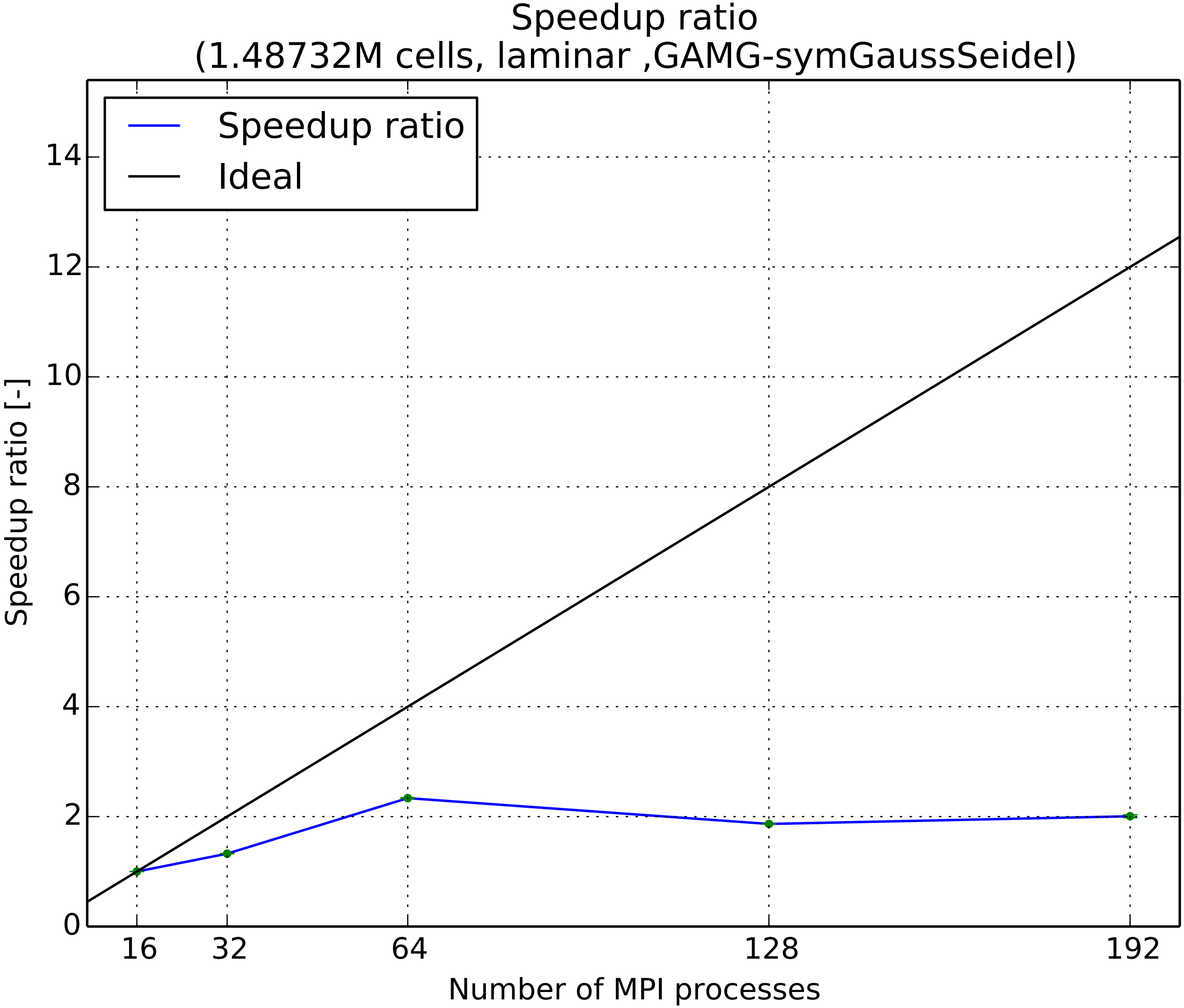
14
16
32
64
128
192
Number of MPI processes


Parallel efficiency
(1.48732M cells, laminar ,GAMG-nonBlockingGaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes


Execution time per time step
(1.48732M cells, laminar ,GAMG-symGaussSeidel)
Execution time per time step [s]
0
1
2
3
4
16
32
64
128
192
Number of MPI processes


Speedup ratio
(1.48732M cells, laminar ,GAMG-symGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
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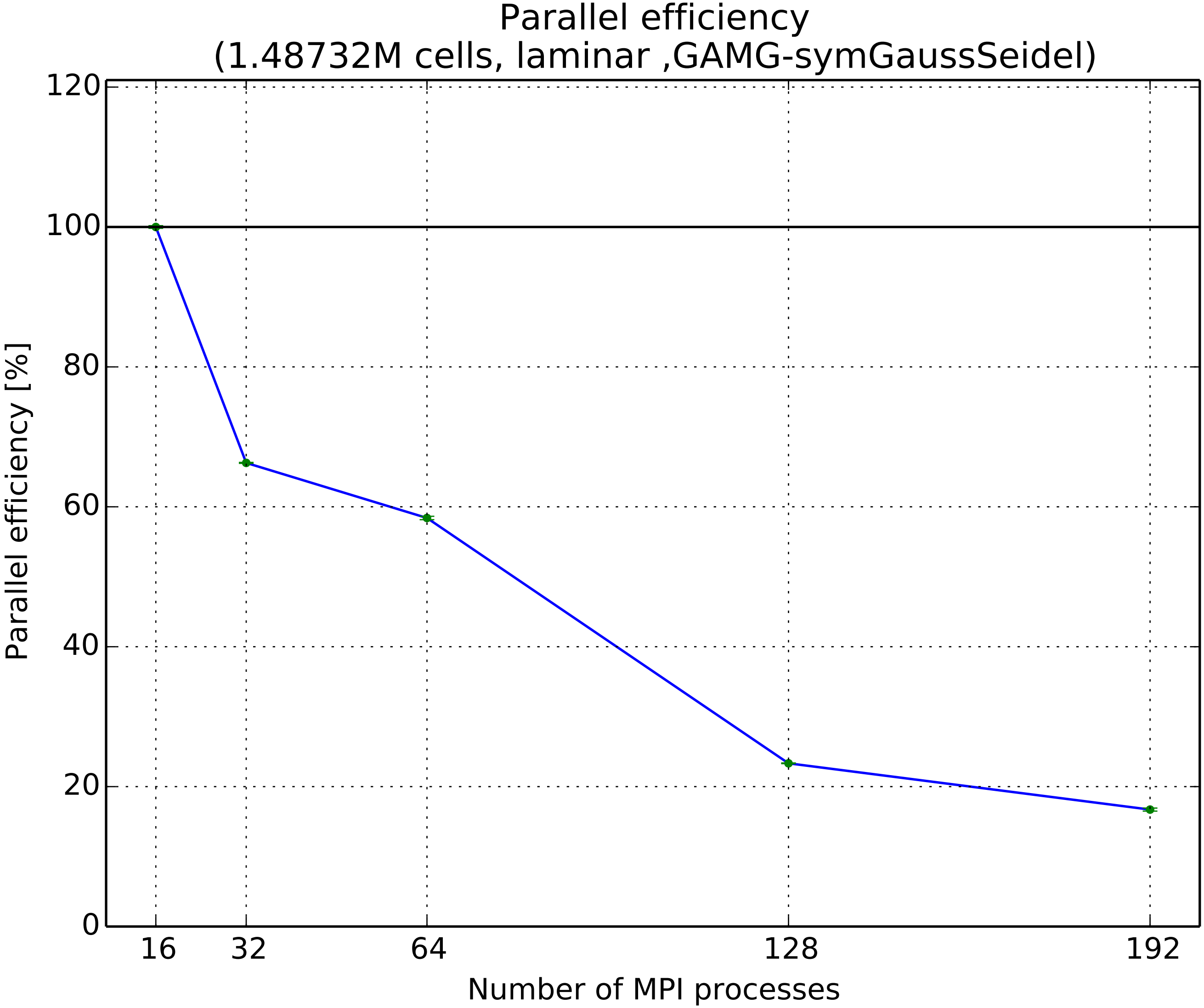
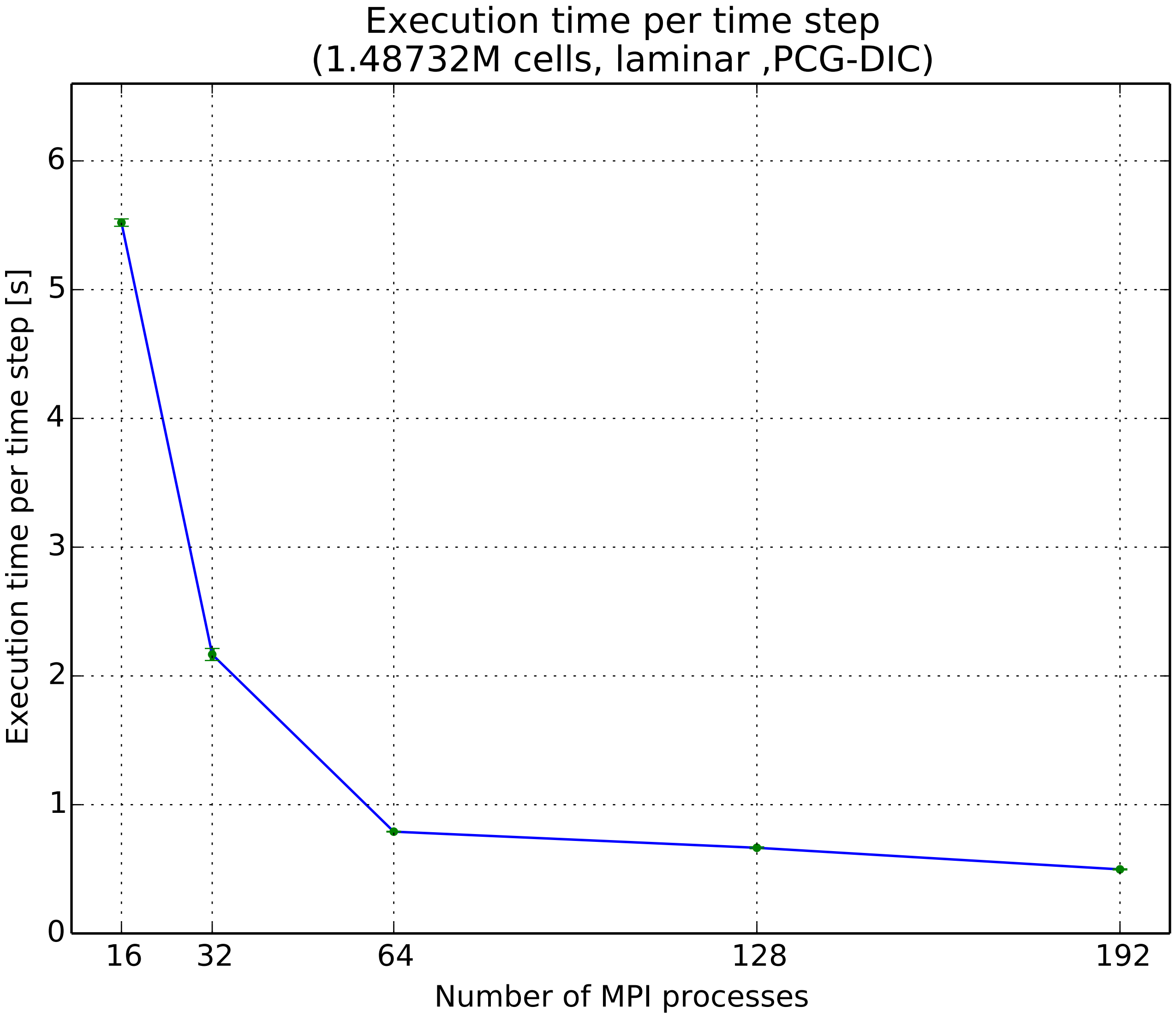
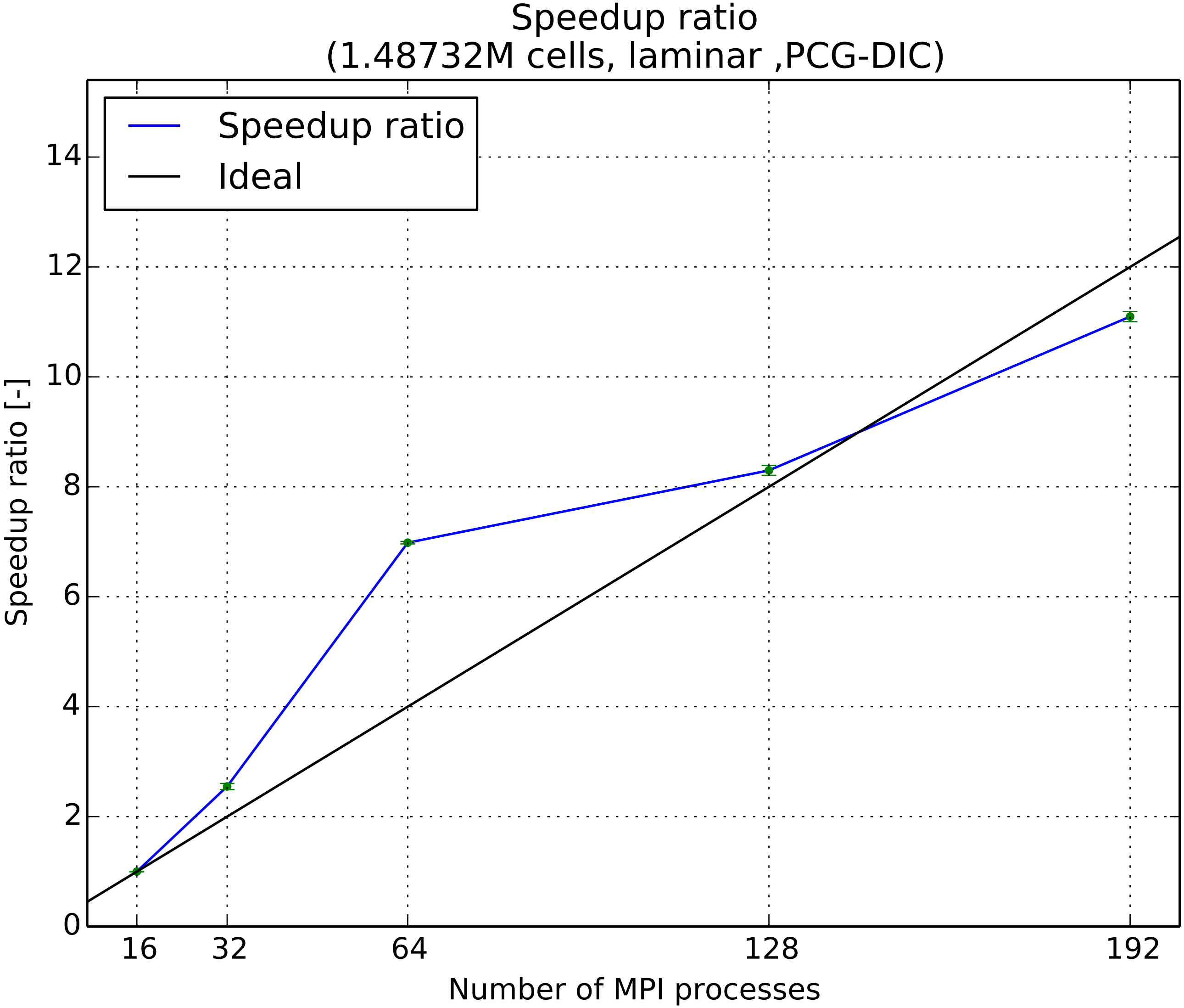
8
10
12
14
16
32
64
128
192
Number of MPI processes


Parallel efficiency
(1.48732M cells, laminar ,GAMG-symGaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes


Execution time per time step
(1.48732M cells, laminar ,PCG-DIC)
Execution time per time step [s]
0
1
2
3
4
5
6
16
32
64
128
192
Number of MPI processes


Speedup ratio
(1.48732M cells, laminar ,PCG-DIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
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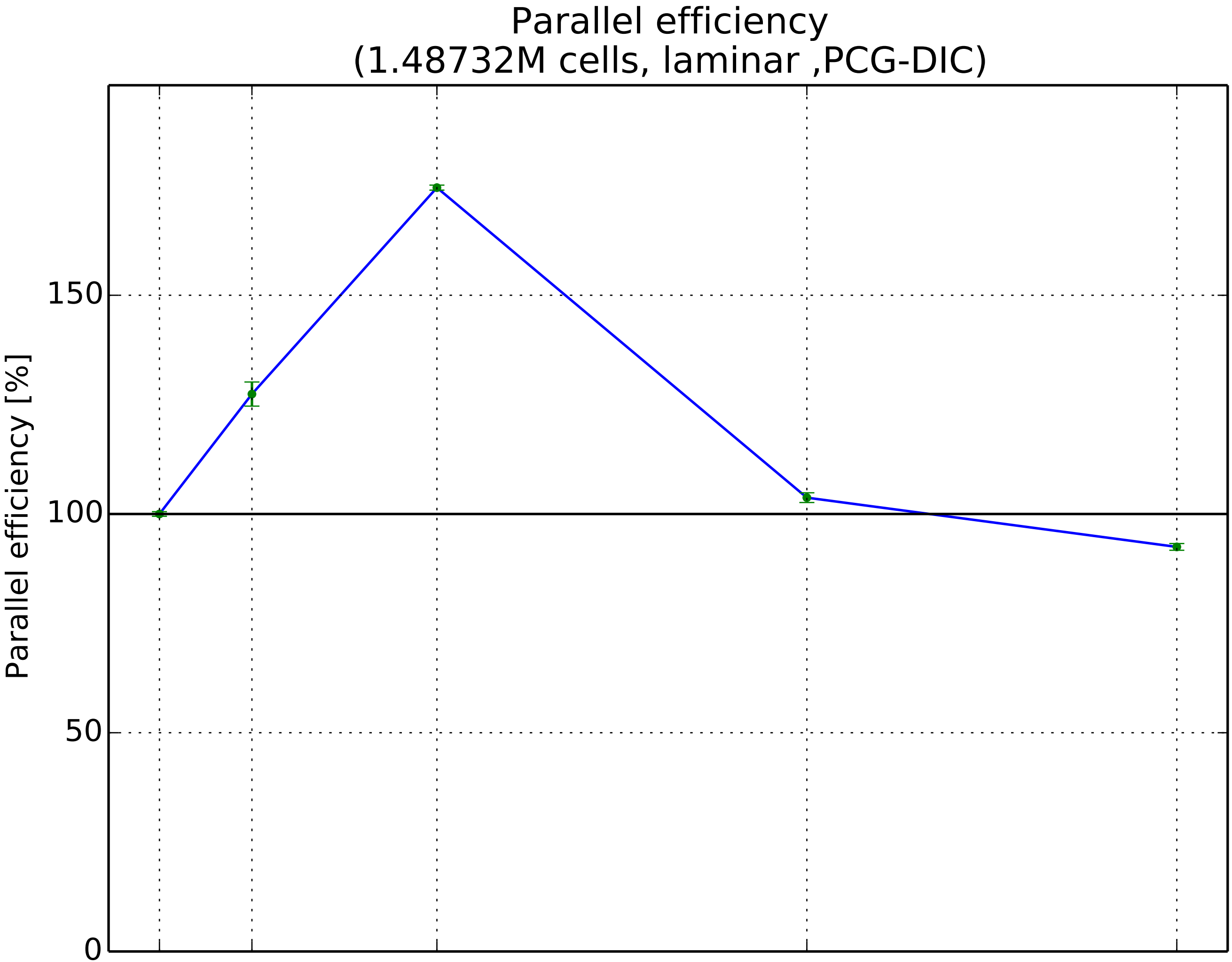
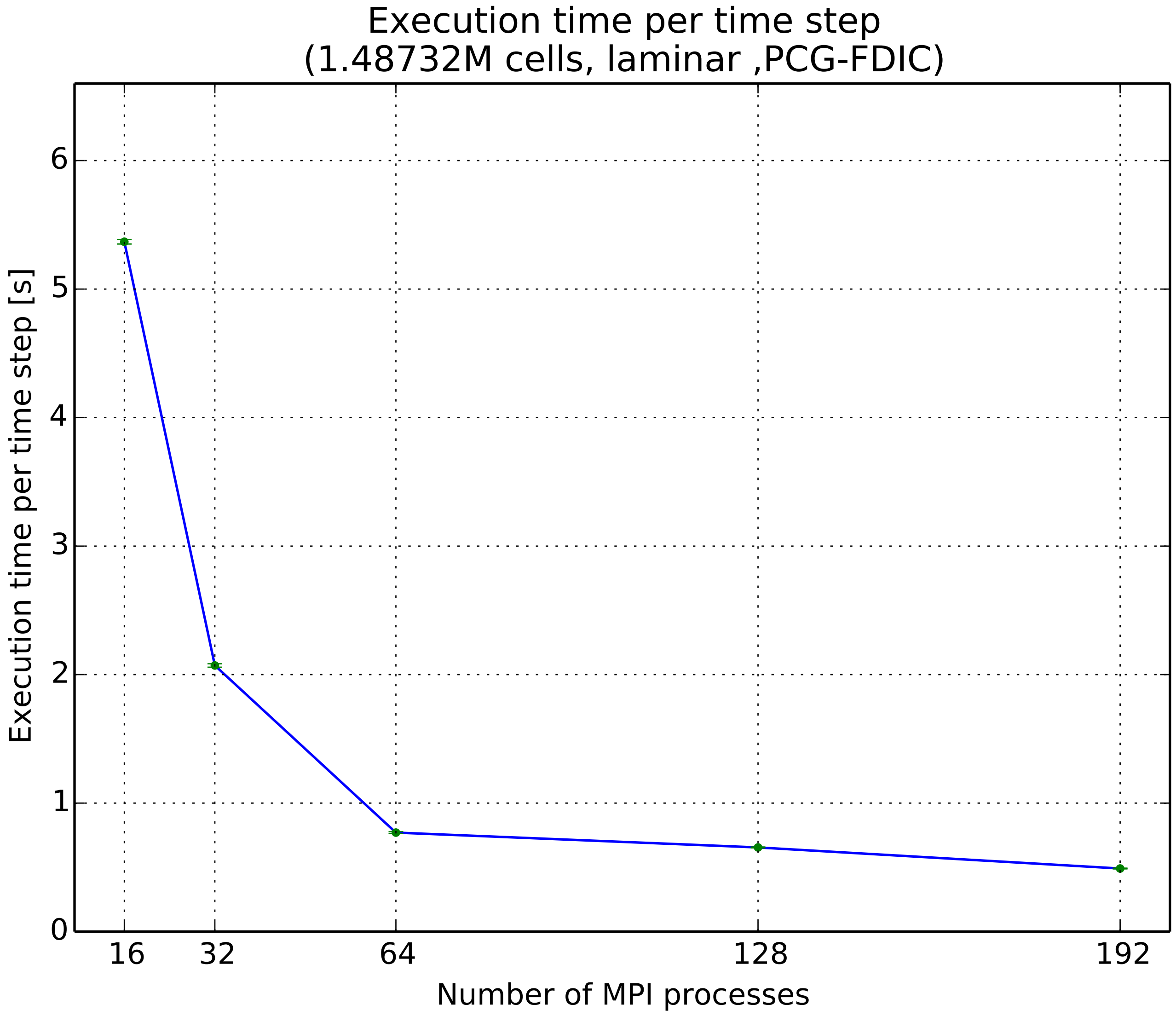
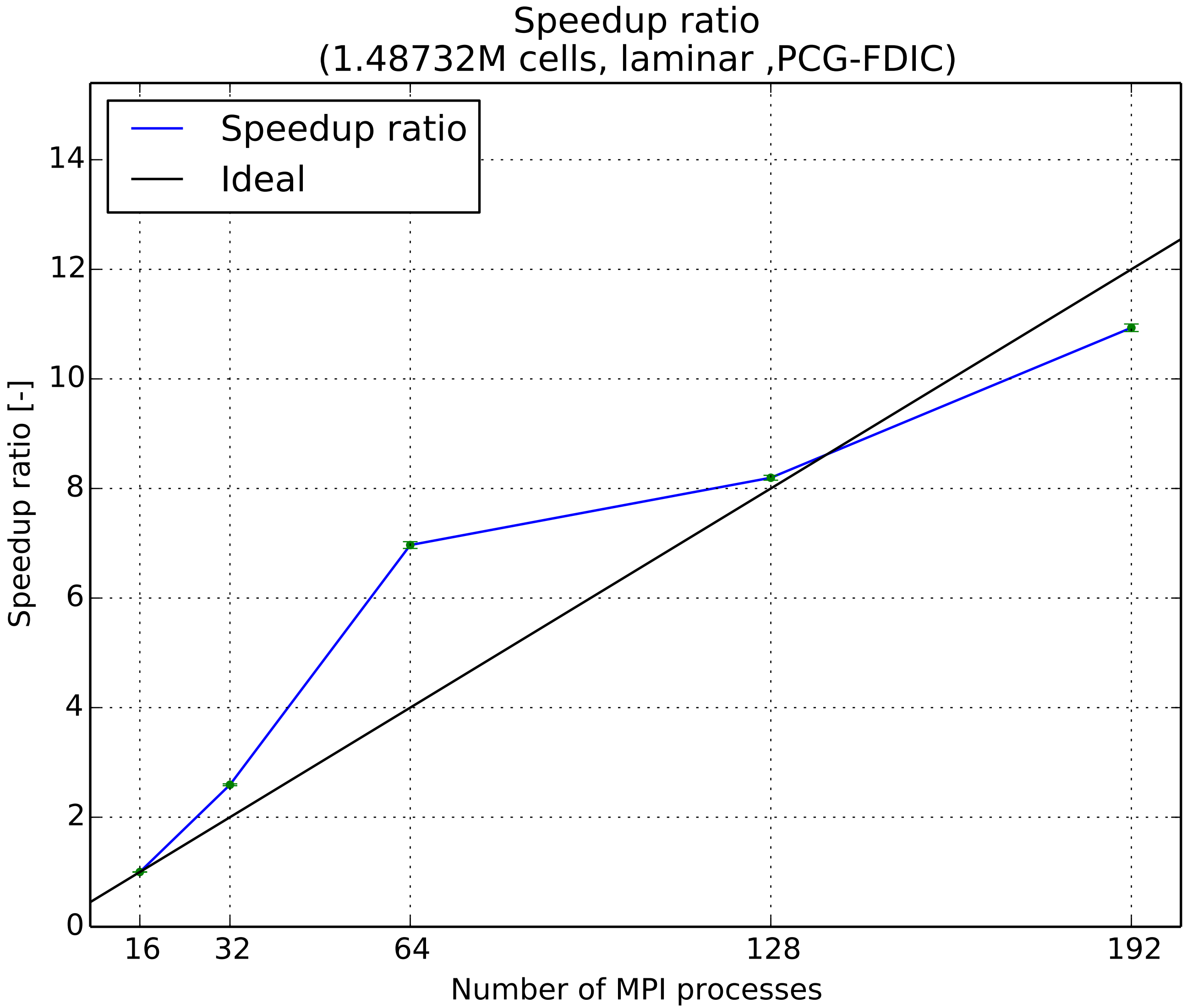
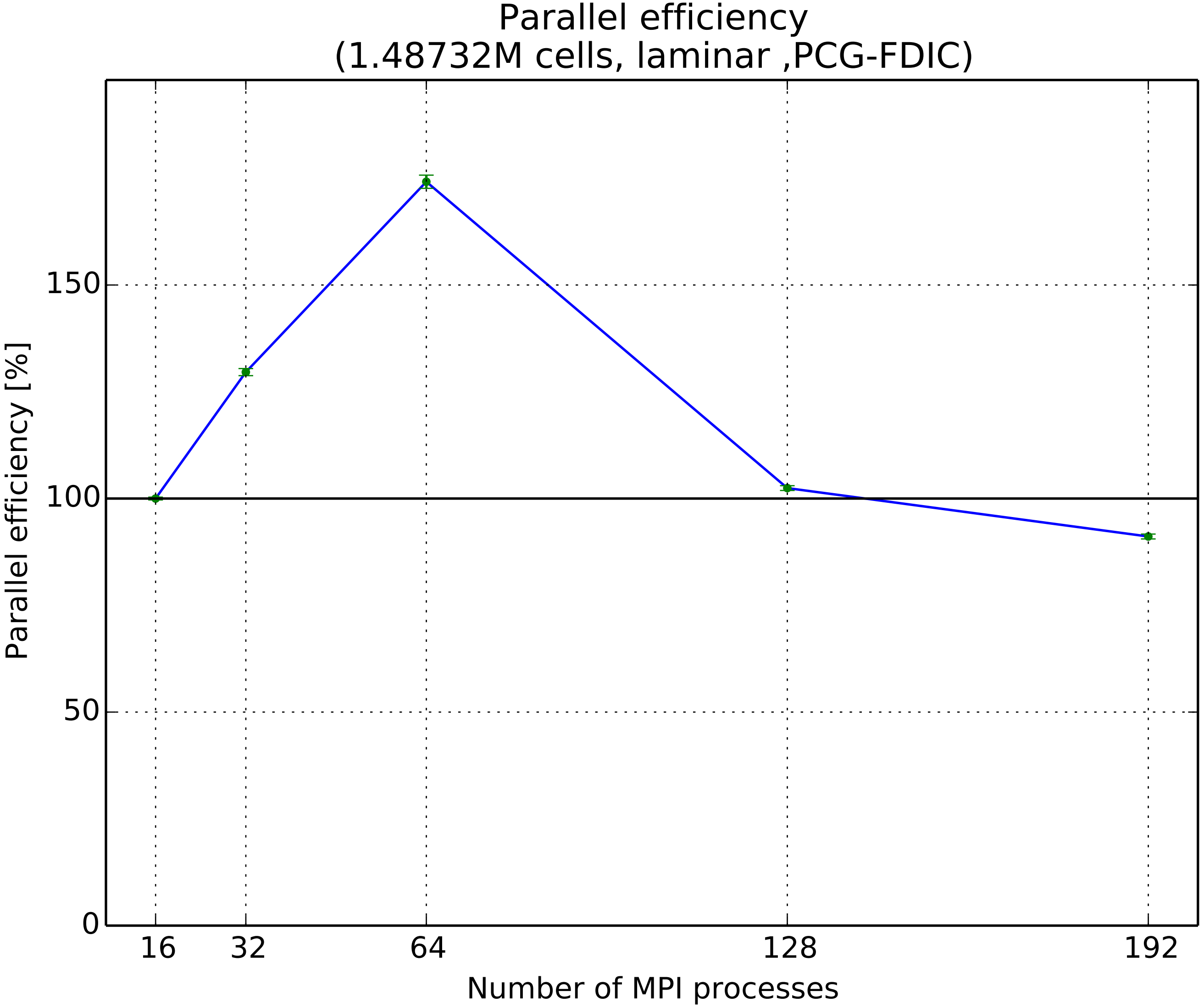
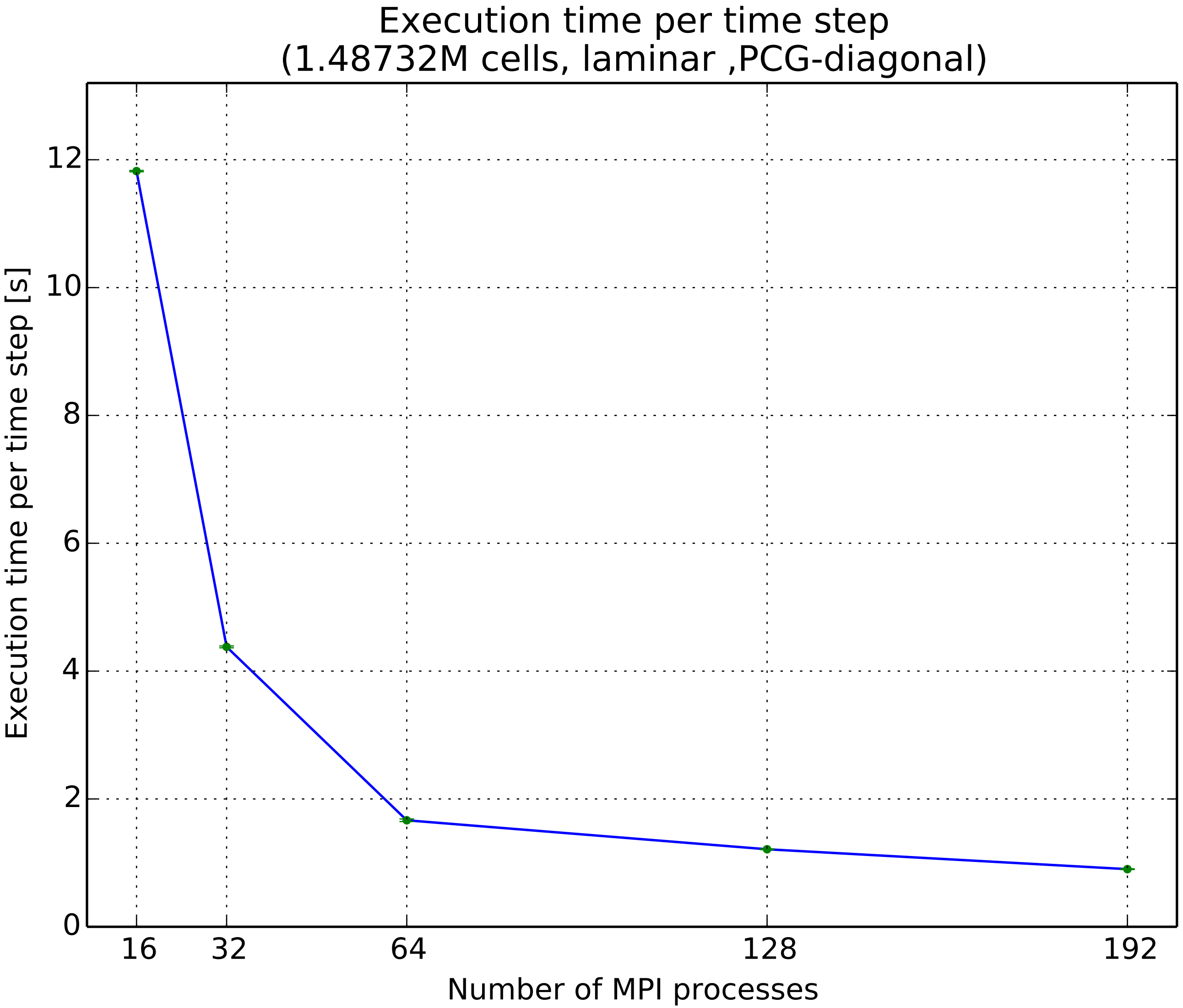
14
16
32
64
128
192
Number of MPI processes

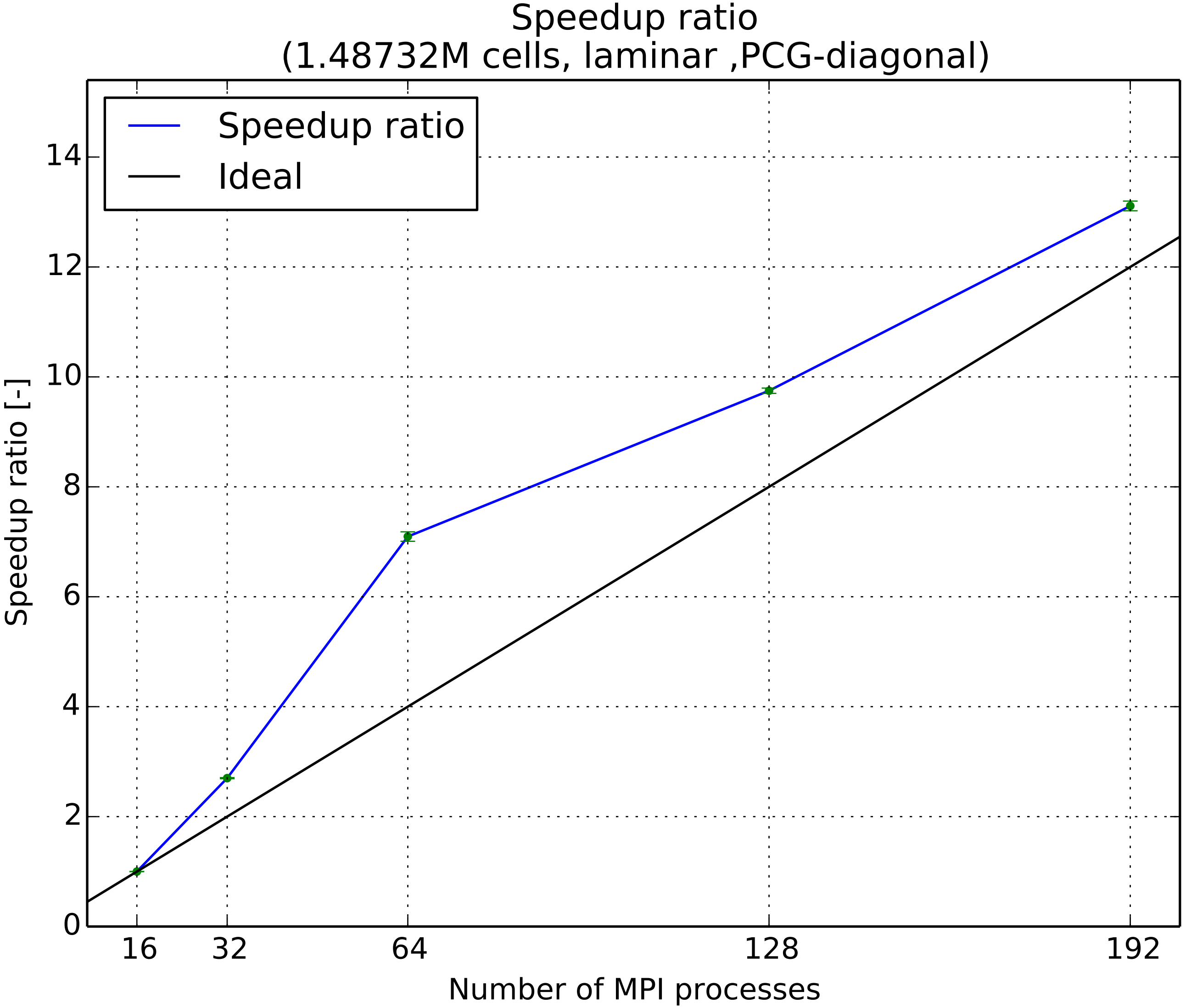

Parallel efficiency
(1.48732M cells, laminar ,PCG-DIC)
Parallel efficiency [%]
0
50
100
150
16
32
64
128
192
Number of MPI processes


Execution time per time step
(1.48732M cells, laminar ,PCG-FDIC)
Execution time per time step [s]
0
1
2
3
4
5
6
16
32
64
128
192
Number of MPI processes

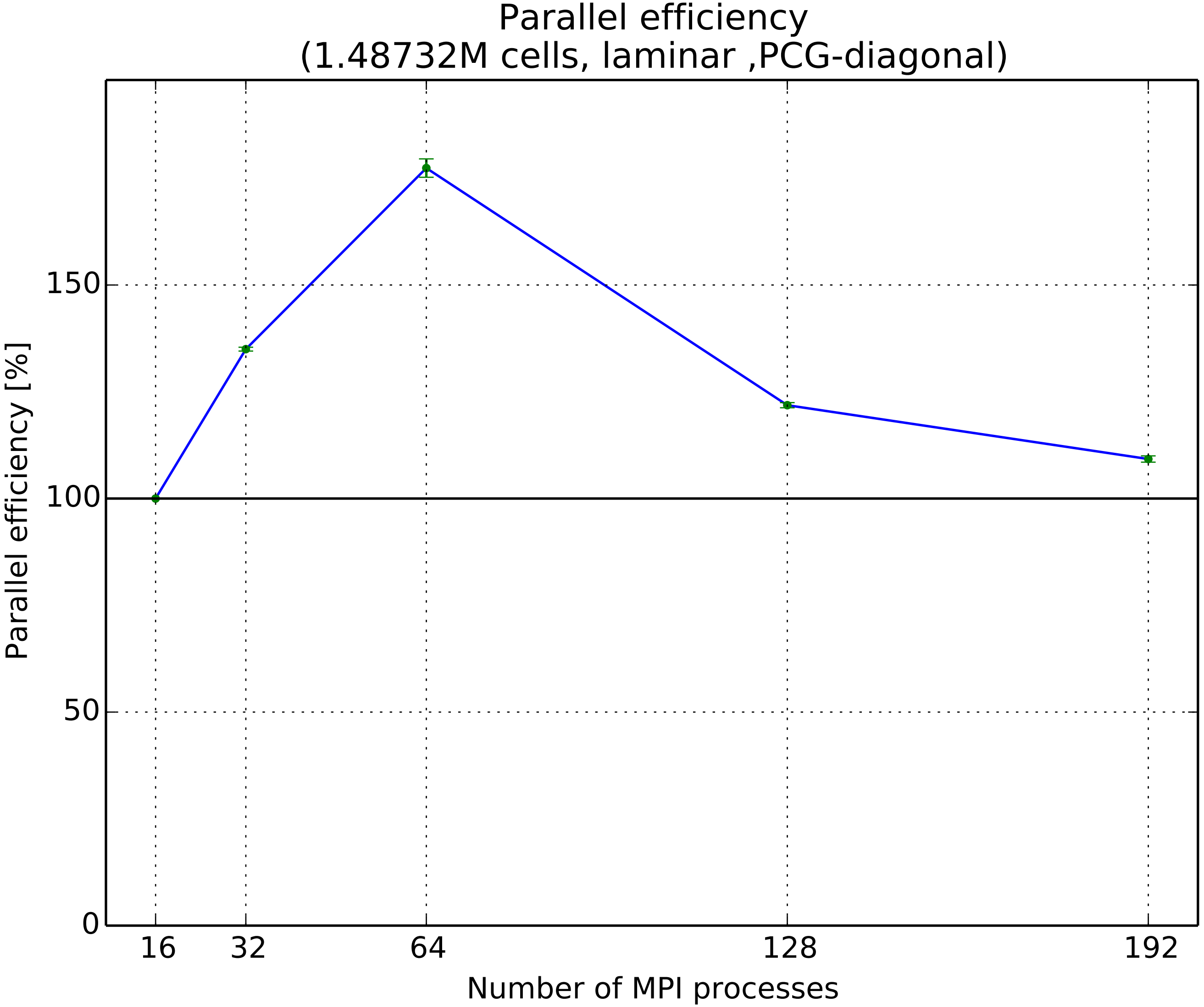

Speedup ratio
(1.48732M cells, laminar ,PCG-FDIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

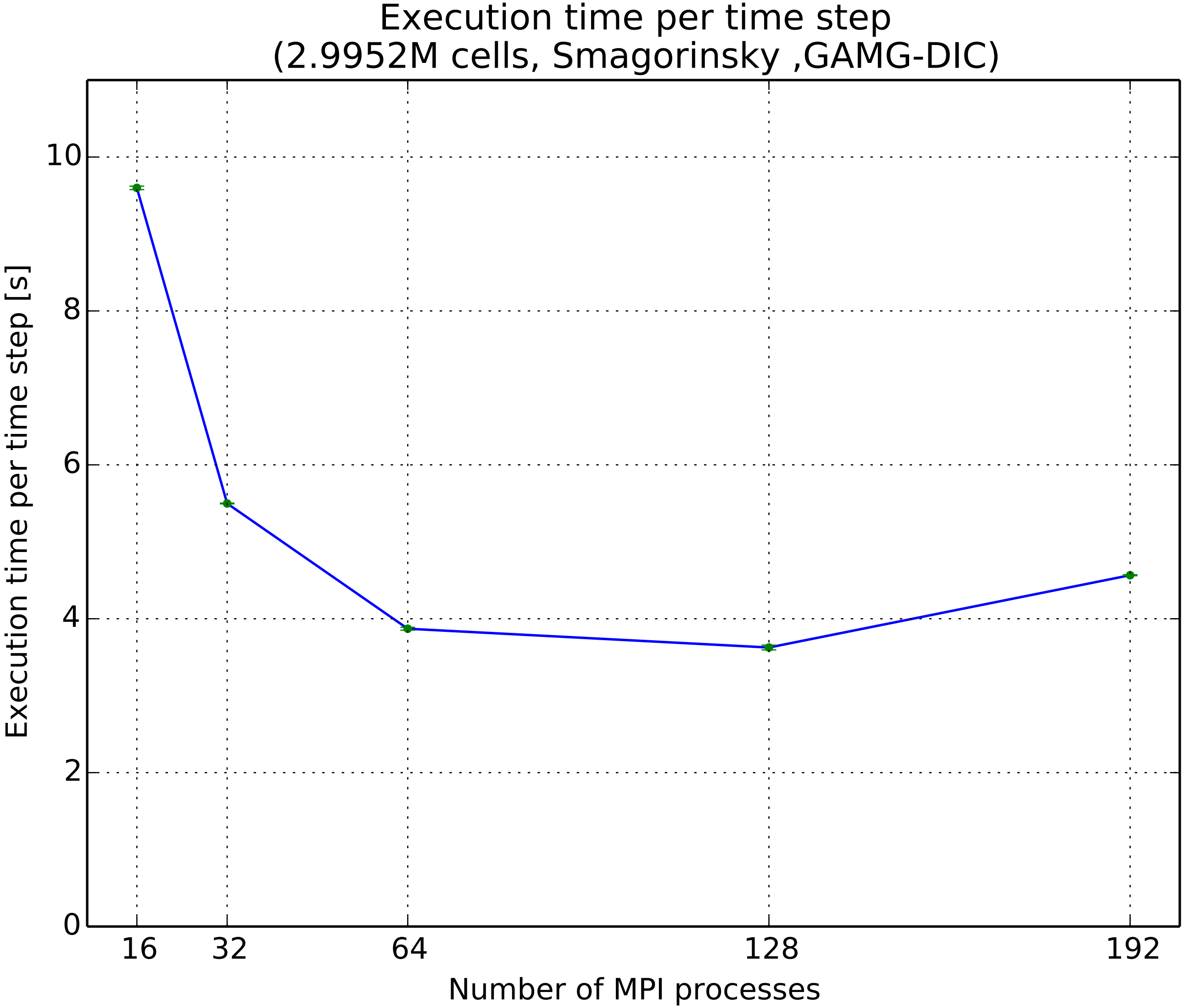

Parallel efficiency
(1.48732M cells, laminar ,PCG-FDIC)
Parallel efficiency [%]
150
100
50
0
16
32
64
128
192
Number of MPI processes


Execution time per time step
(1.48732M cells, laminar ,PCG-diagonal)
Execution time per time step [s]
0
2
4
6
8
10
12
16
32
64
128
192
Number of MPI processes

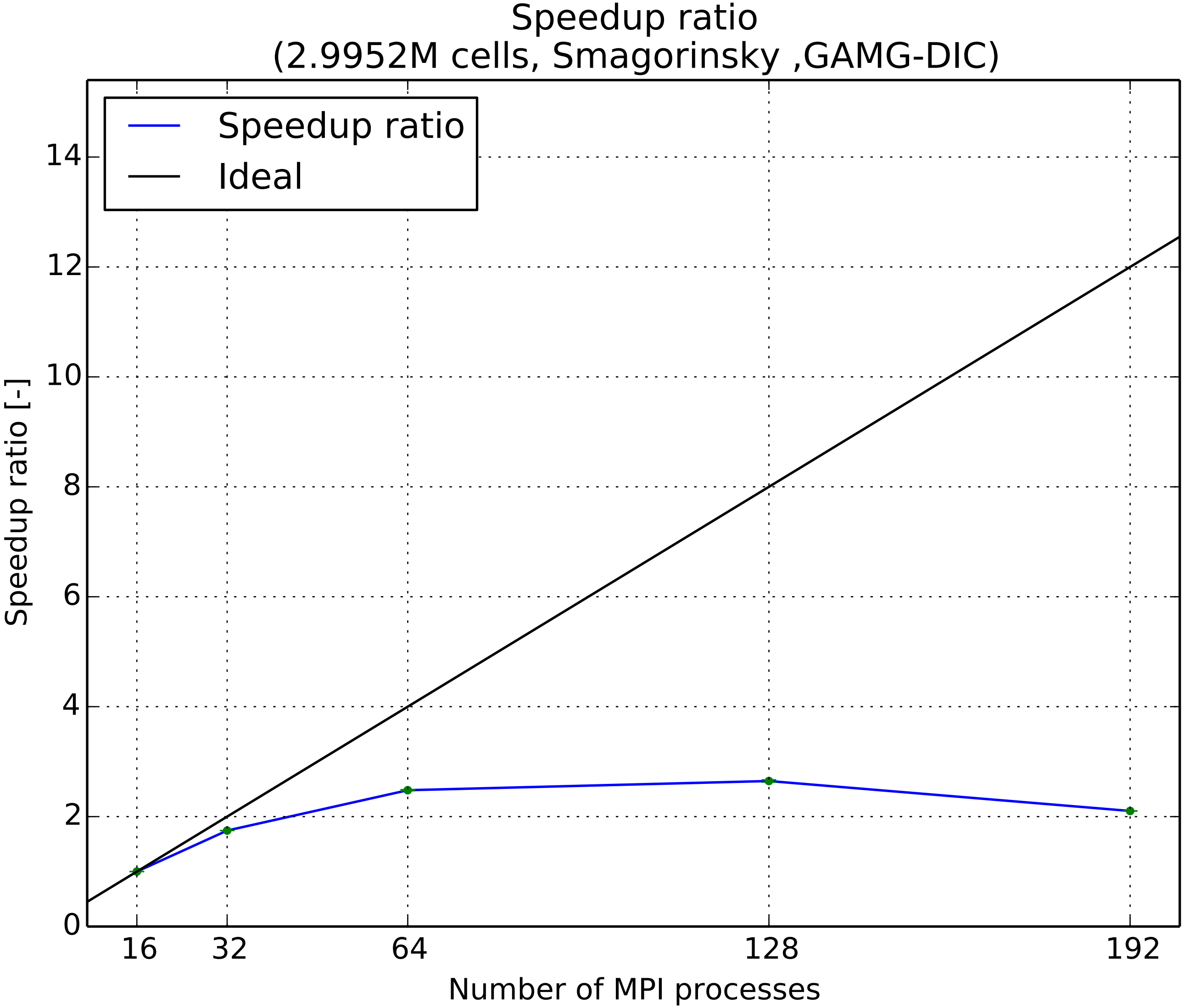


Speedup ratio
(1.48732M cells, laminar ,PCG-diagonal)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes


Parallel efficiency
(1.48732M cells, laminar ,PCG-diagonal)
Parallel efficiency [%]
0
50
100
150
16
32
64
128
192
Number of MPI processes



Execution time per time step
(2.9952M cells, Smagorinsky ,GAMG-DIC)
Execution time per time step [s]
0
2
4
6
8
10
16
32
64
128
192
Number of MPI processes


Speedup ratio
(2.9952M cells, Smagorinsky ,GAMG-DIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
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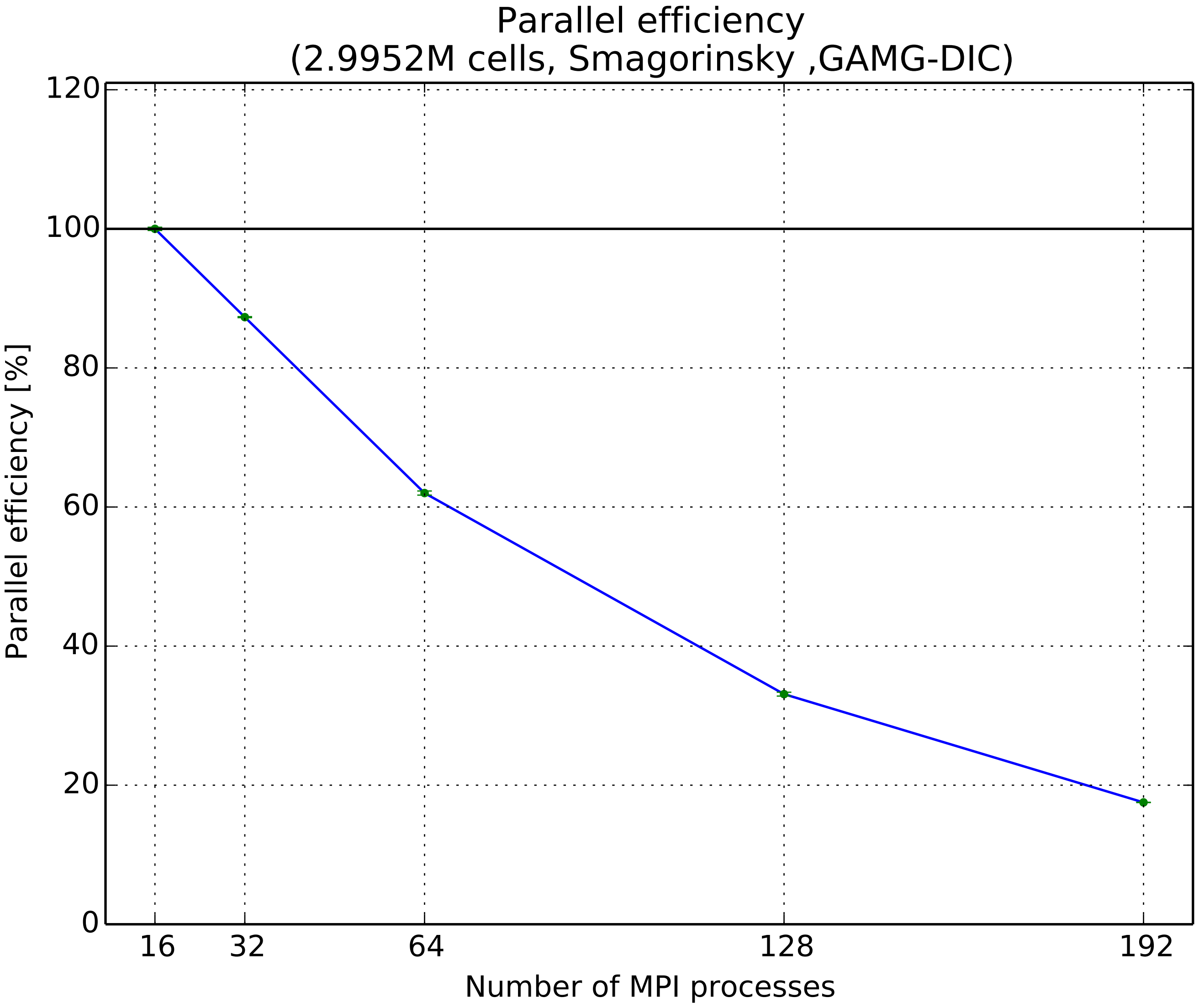
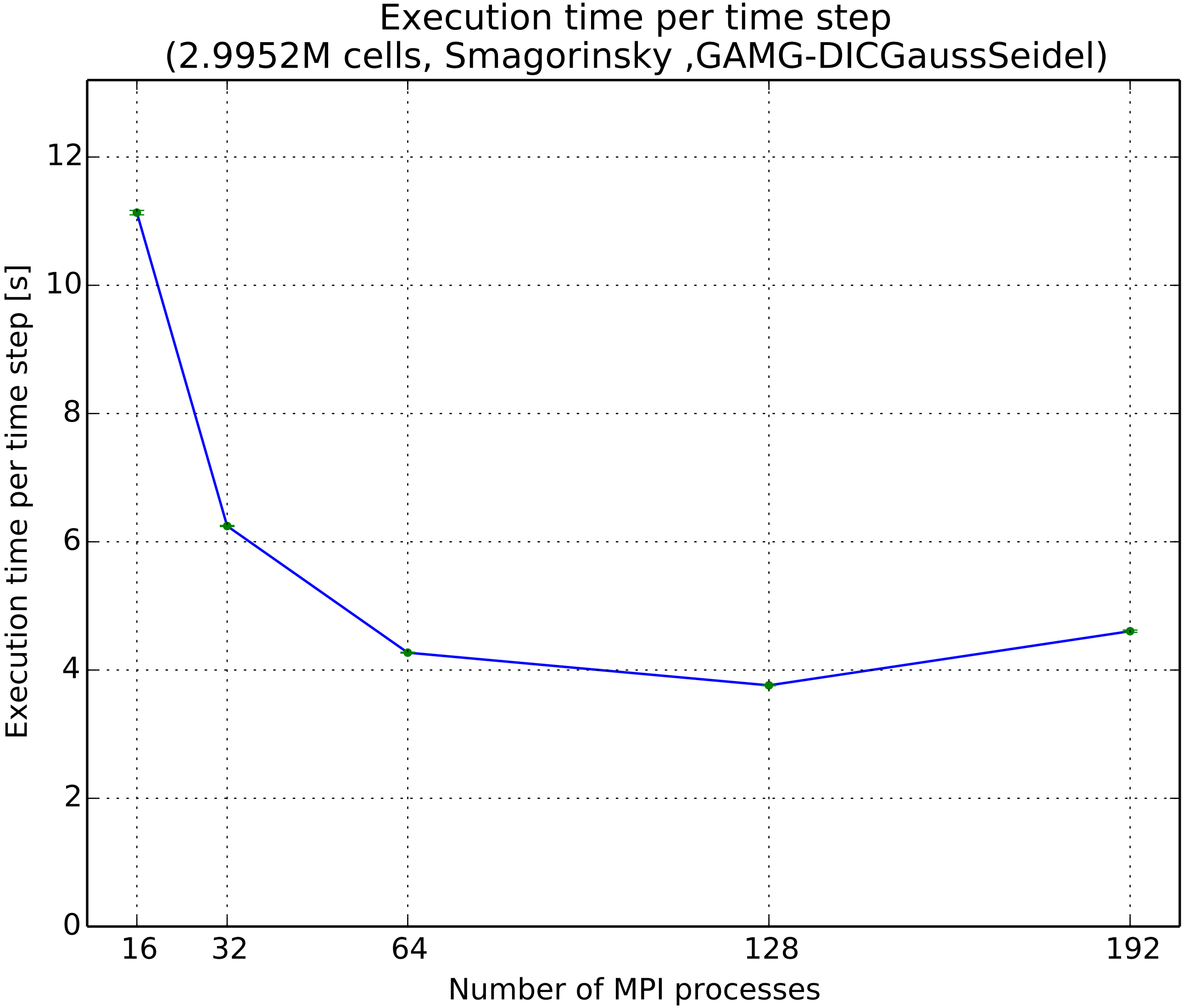
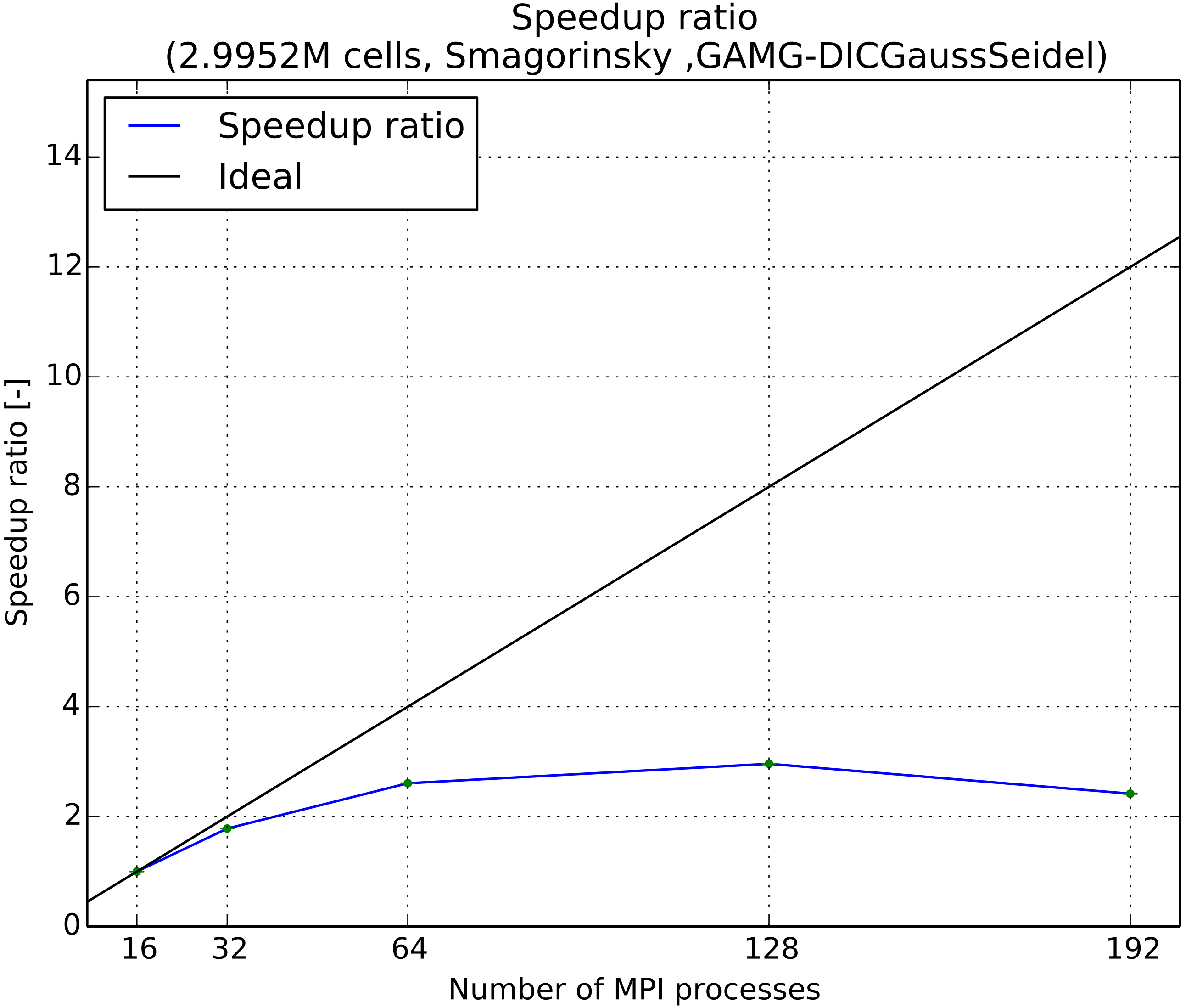
128
192
Number of MPI processes


Parallel efficiency
(2.9952M cells, Smagorinsky ,GAMG-DIC)
Parallel efficiency [%]
120
100
80
60
40
20
0
16
32
64
128
192
Number of MPI processes


Execution time per time step
(2.9952M cells, Smagorinsky ,GAMG-DICGaussSeidel)
Execution time per time step [s]
0
2
4
6
8
10
12
16
32
64
128
192
Number of MPI processes


Speedup ratio
(2.9952M cells, Smagorinsky ,GAMG-DICGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
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14
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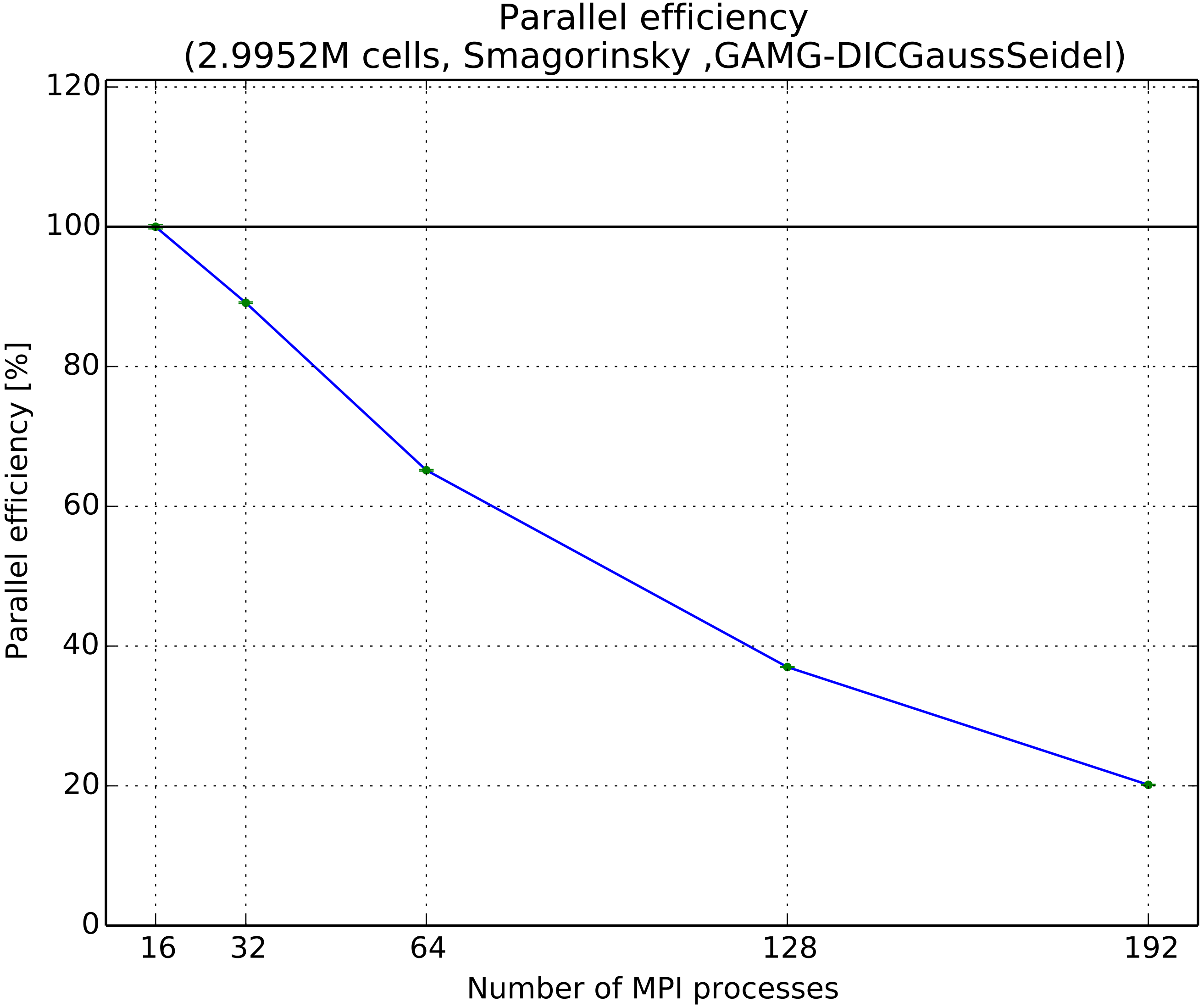
32
64
128
192
Number of MPI processes


Parallel efficiency
(2.9952M cells, Smagorinsky ,GAMG-DICGaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
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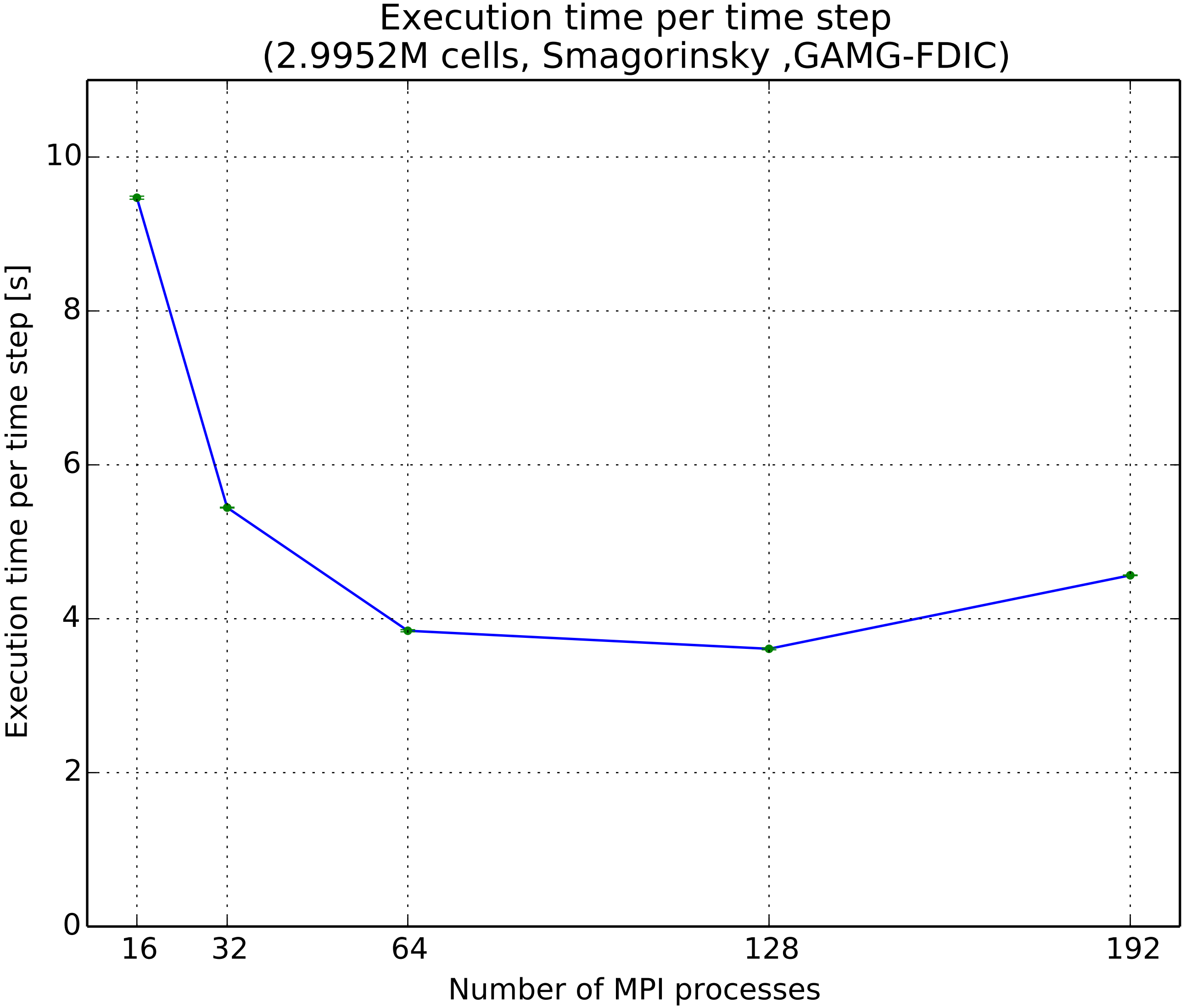
120
16
32
64
128
192
Number of MPI processes


Execution time per time step
(2.9952M cells, Smagorinsky ,GAMG-FDIC)
Execution time per time step [s]
0
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10
16
32
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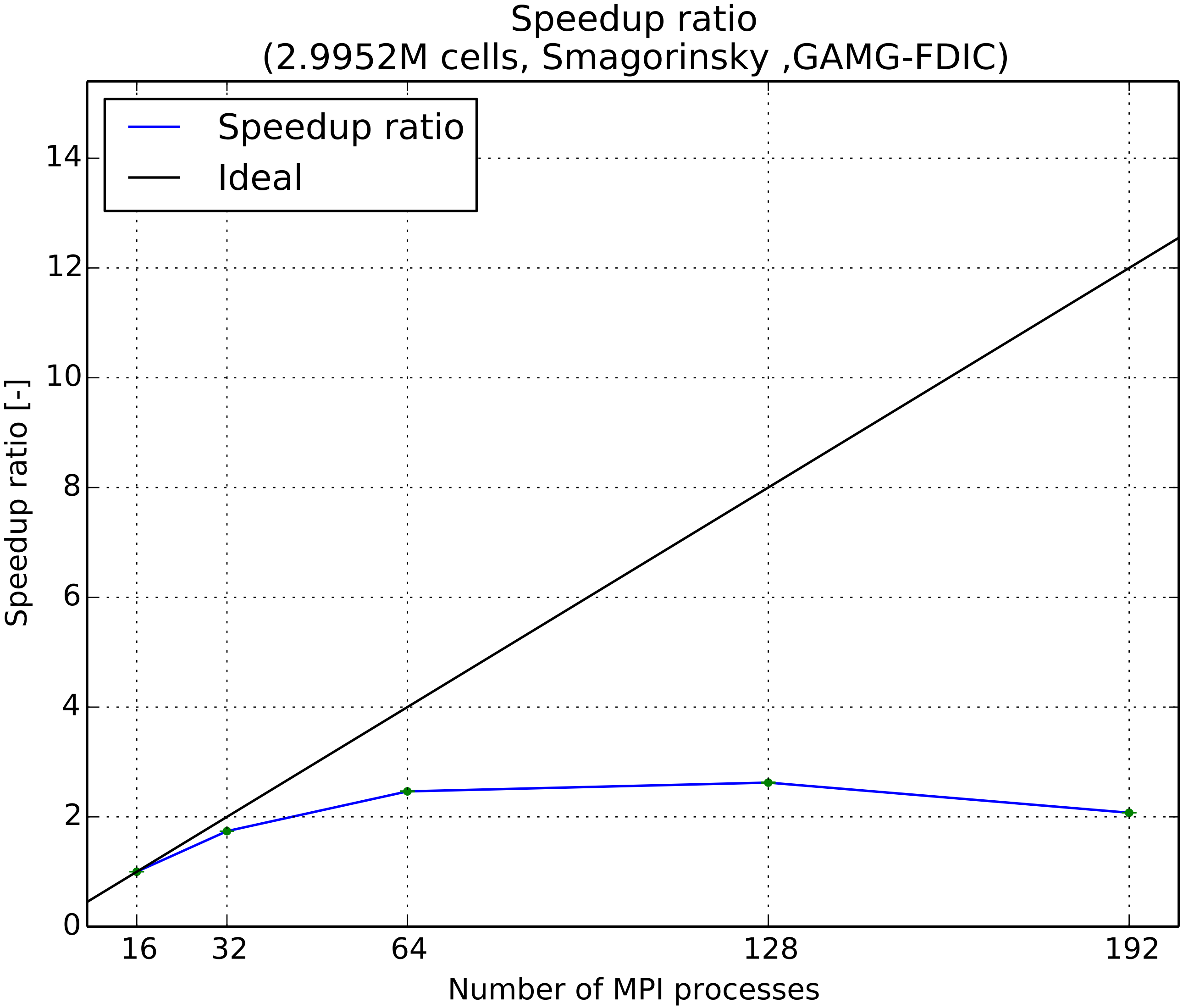
128
192
Number of MPI processes


Speedup ratio
(2.9952M cells, Smagorinsky ,GAMG-FDIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
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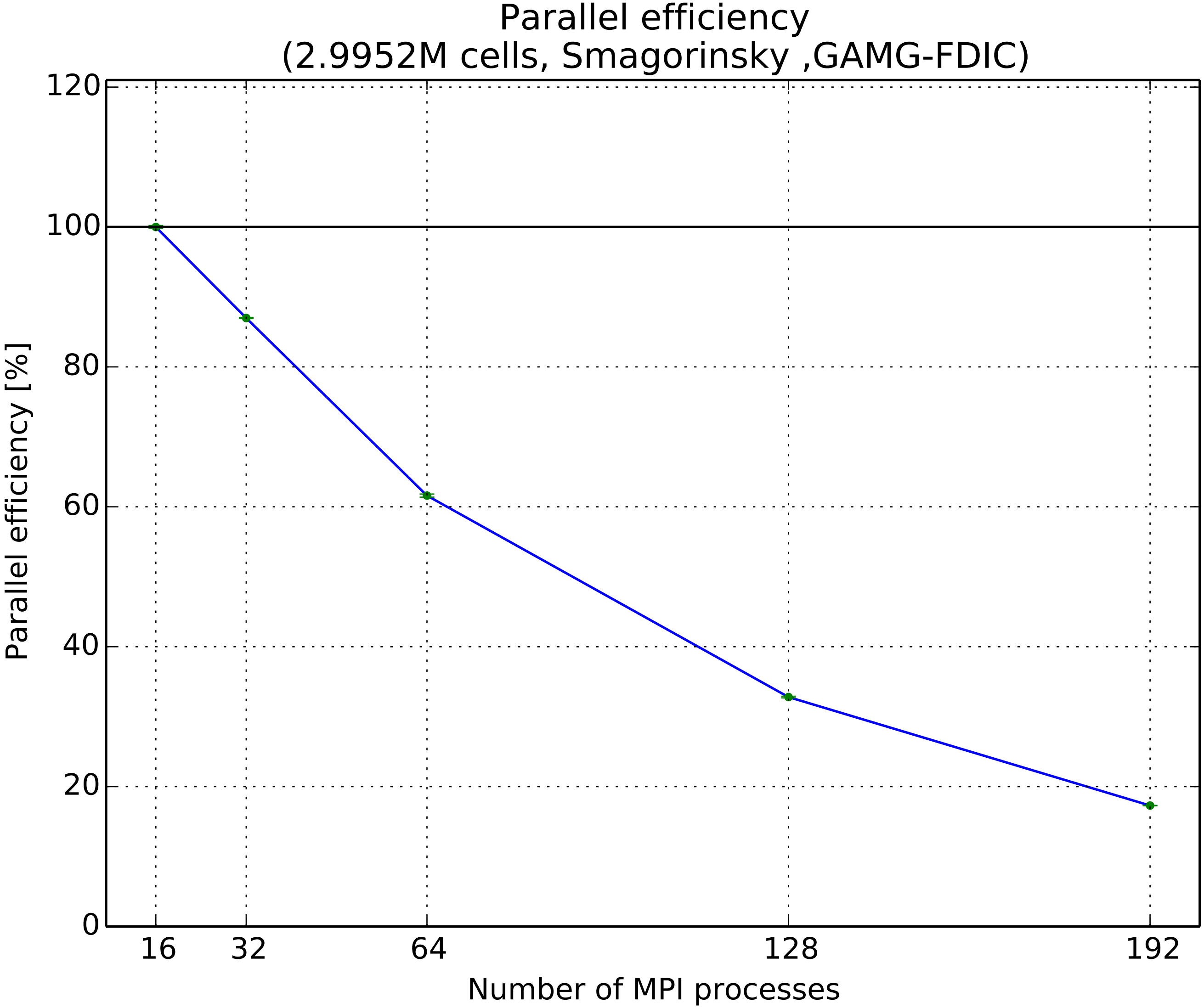
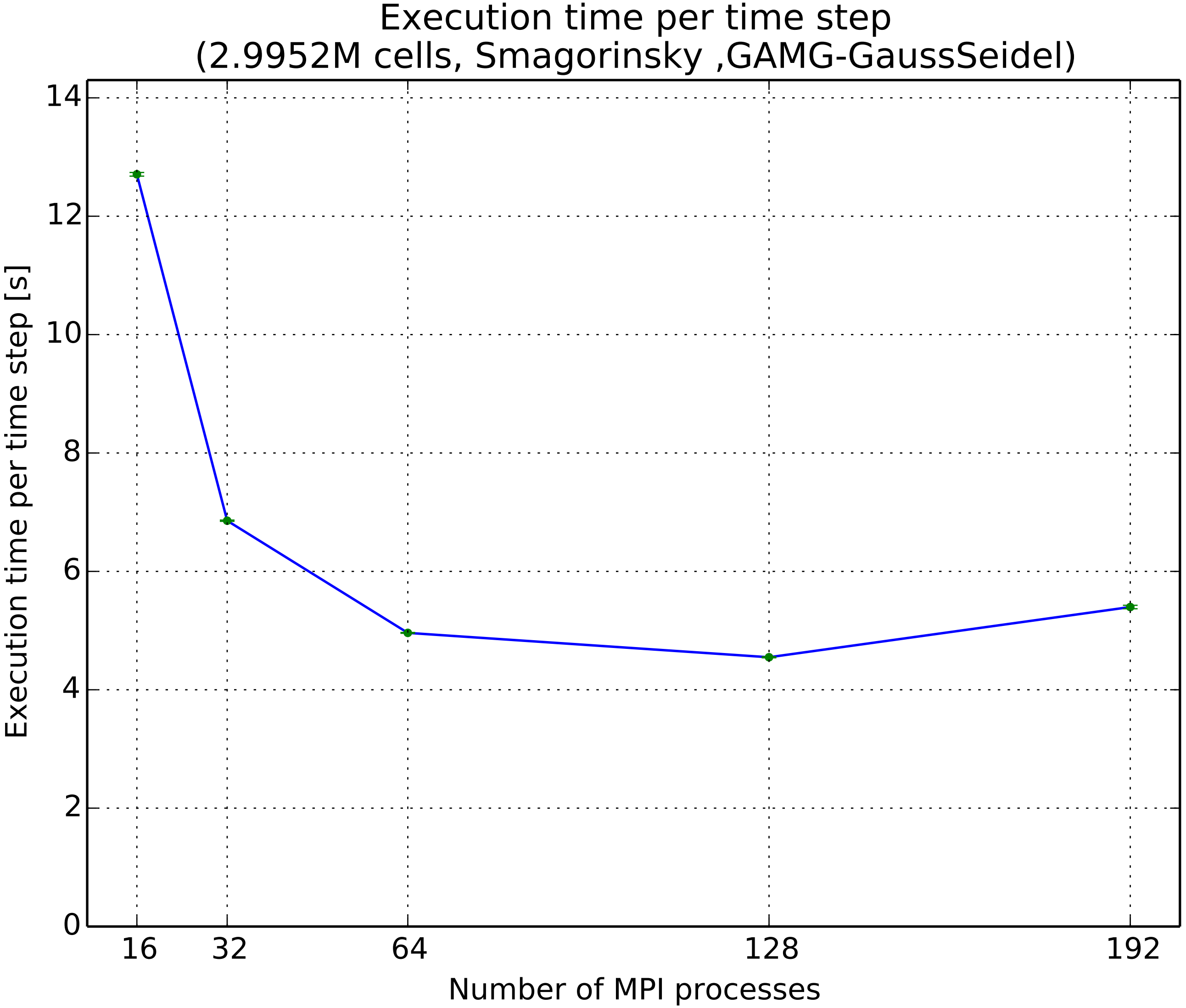
128
192
Number of MPI processes


Parallel efficiency
(2.9952M cells, Smagorinsky ,GAMG-FDIC)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes


Execution time per time step
(2.9952M cells, Smagorinsky ,GAMG-GaussSeidel)
Execution time per time step [s]
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128
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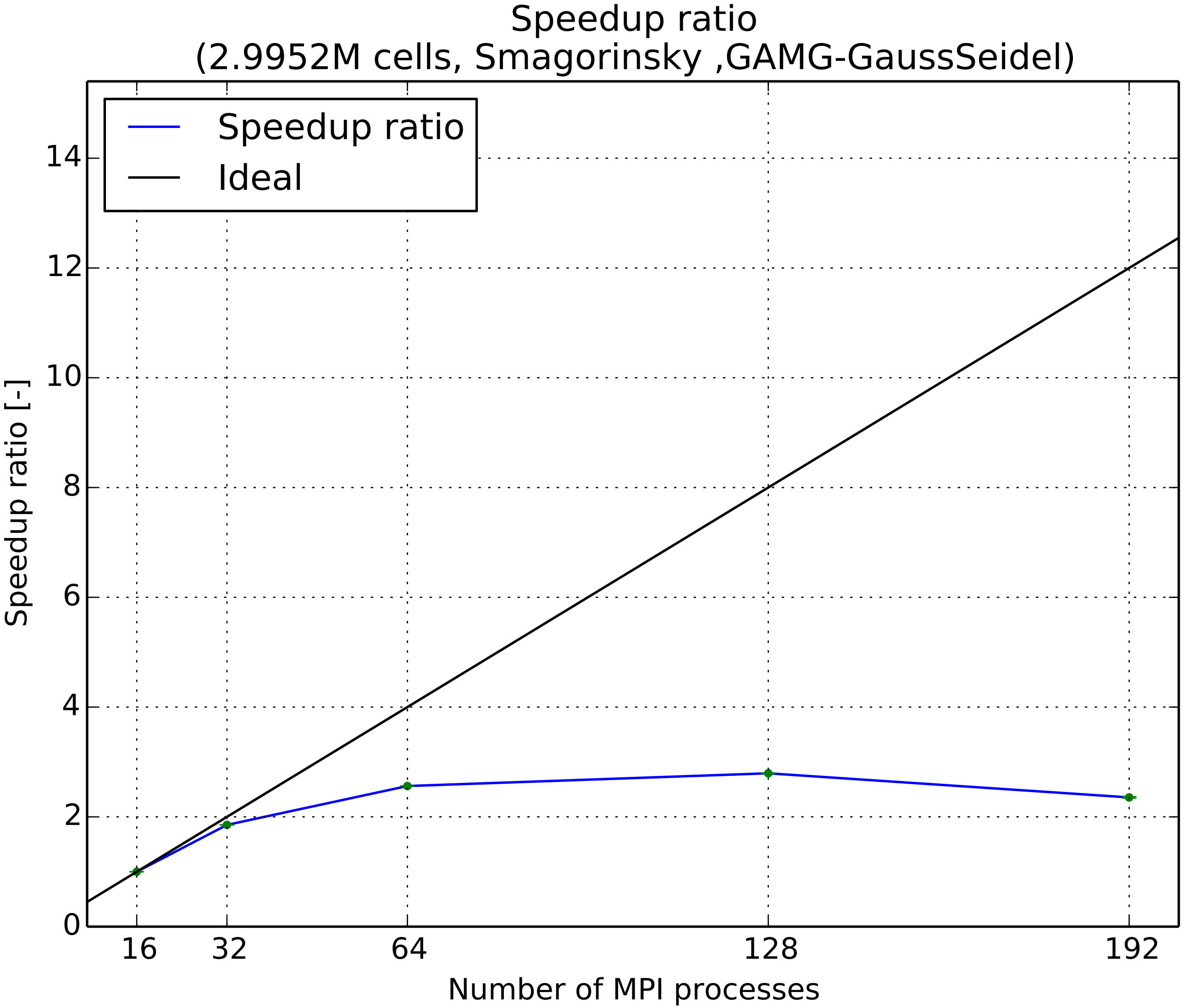
Number of MPI processes


Speedup ratio
(2.9952M cells, Smagorinsky ,GAMG-GaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
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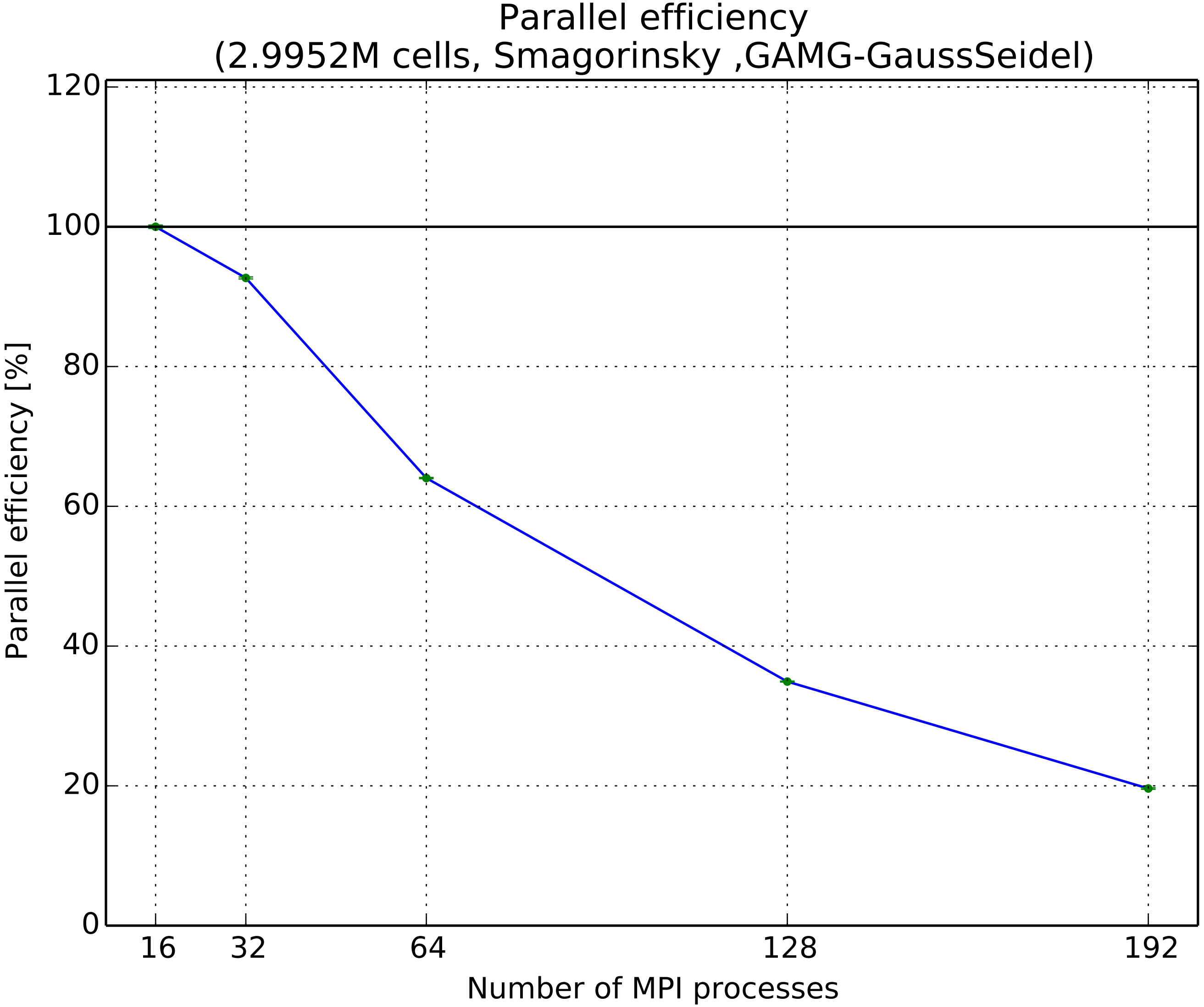
128
192
Number of MPI processes


Parallel efficiency
(2.9952M cells, Smagorinsky ,GAMG-GaussSeidel)
Parallel efficiency [%]
0
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40
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80
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120
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32
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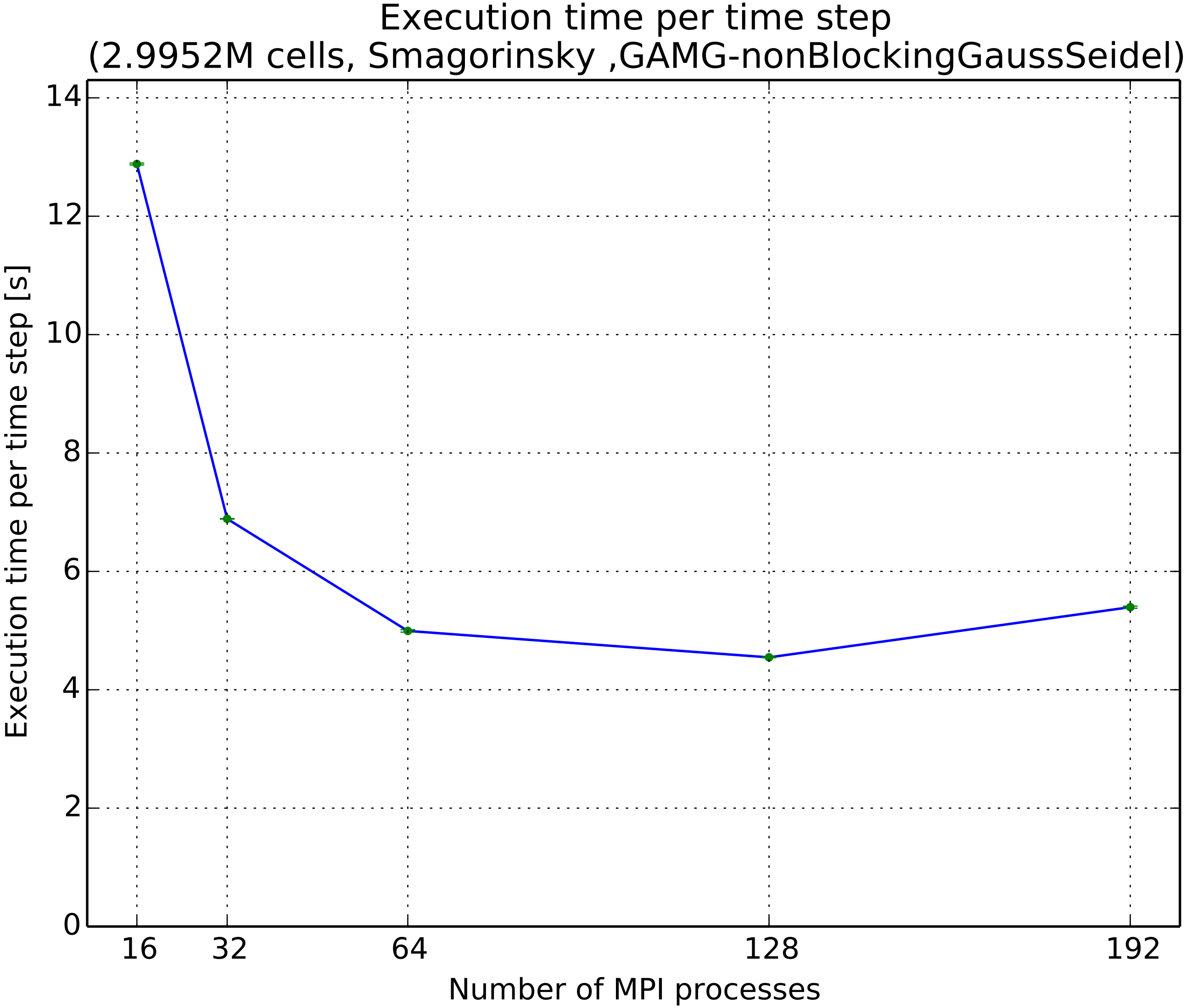
128
192
Number of MPI processes


Execution time per time step
(2.9952M cells, Smagorinsky ,GAMG-nonBlockingGaussSeidel)
Execution time per time step [s]
0
2
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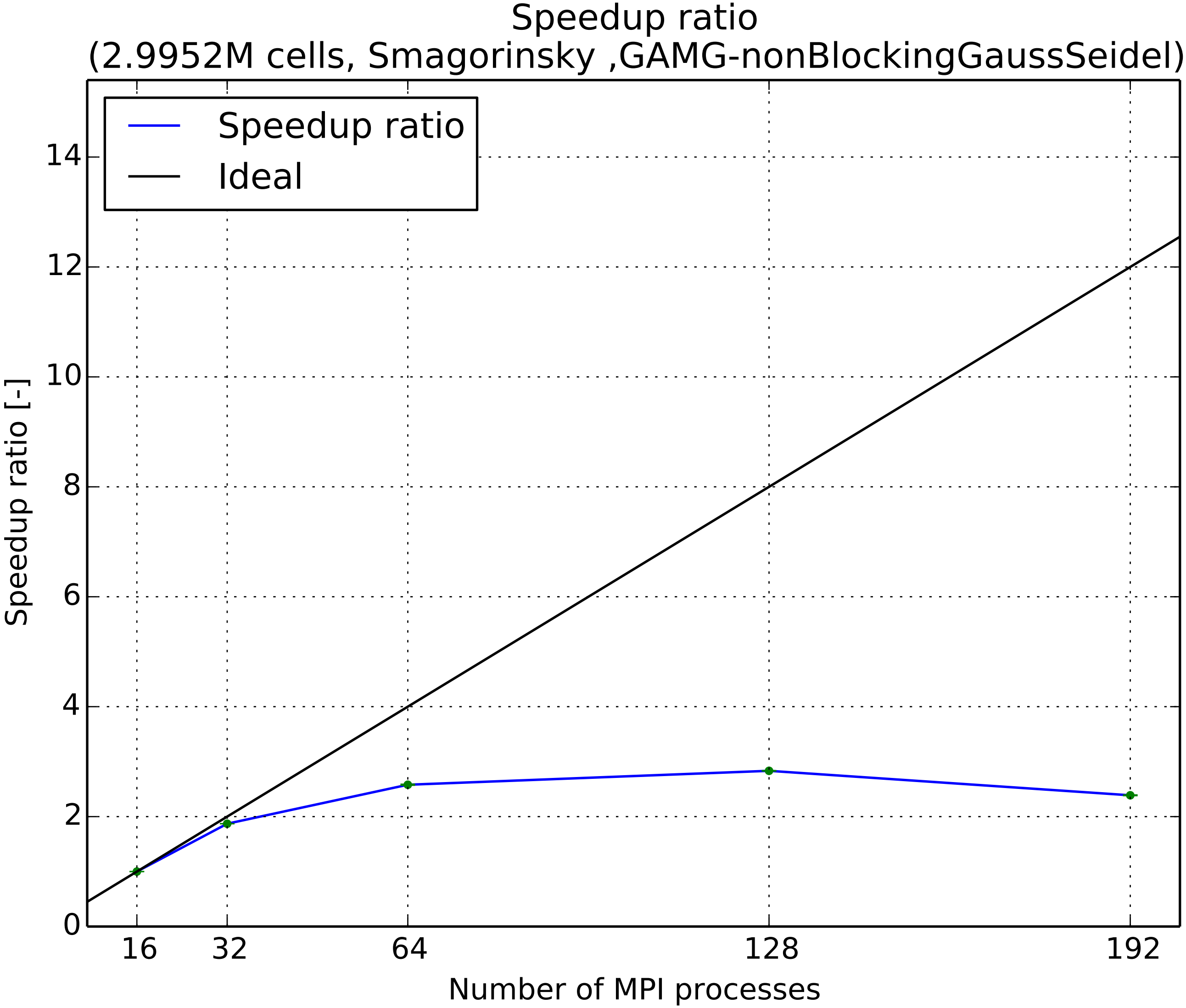
128
192
Number of MPI processes


Speedup ratio
(2.9952M cells, Smagorinsky ,GAMG-nonBlockingGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
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128
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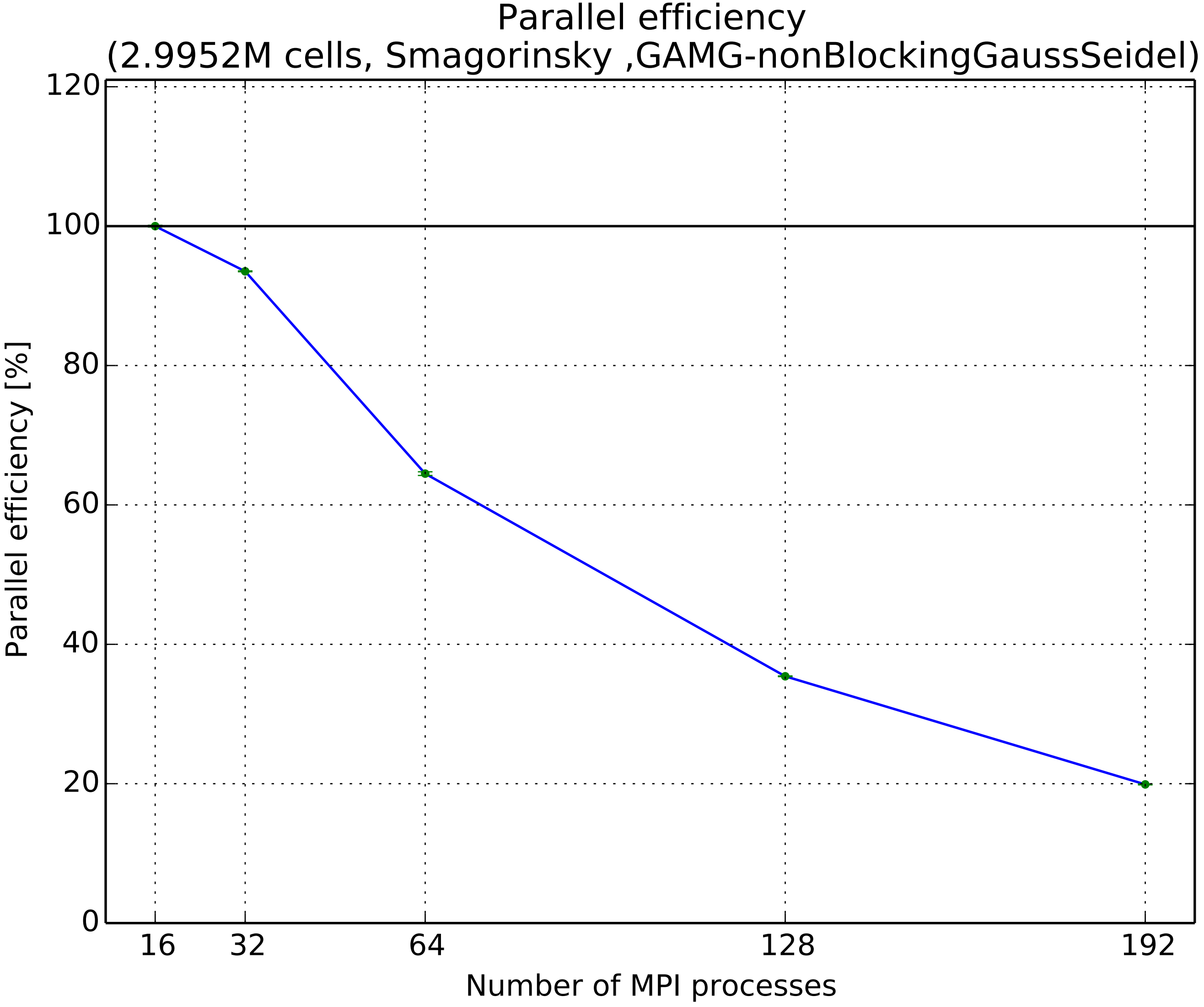
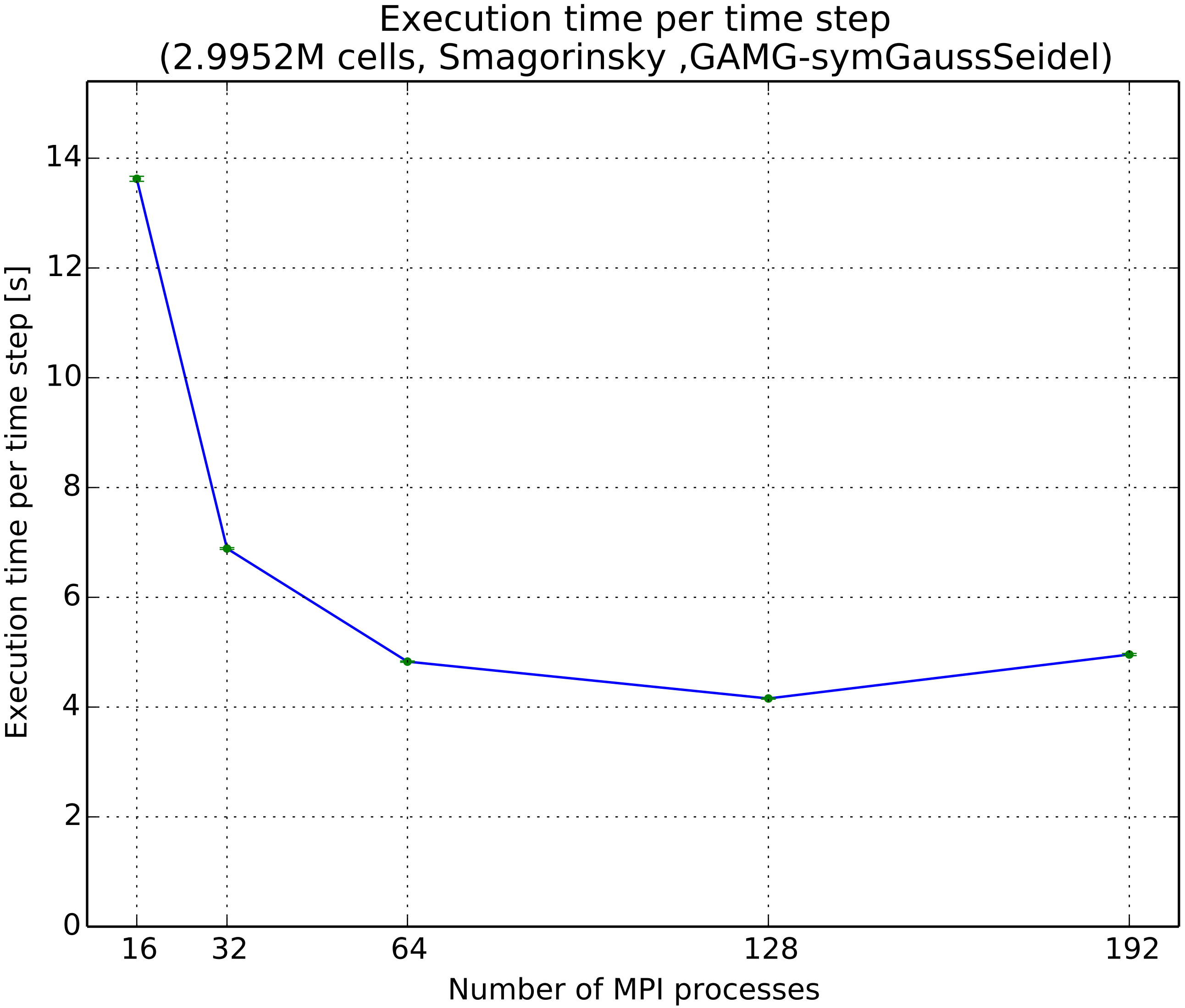
Number of MPI processes


Parallel efficiency
(2.9952M cells, Smagorinsky ,GAMG-nonBlockingGaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
Number of MPI processes
16
32
64
128
192


Execution time per time step
(2.9952M cells, Smagorinsky ,GAMG-symGaussSeidel)
Execution time per time step [s]
0
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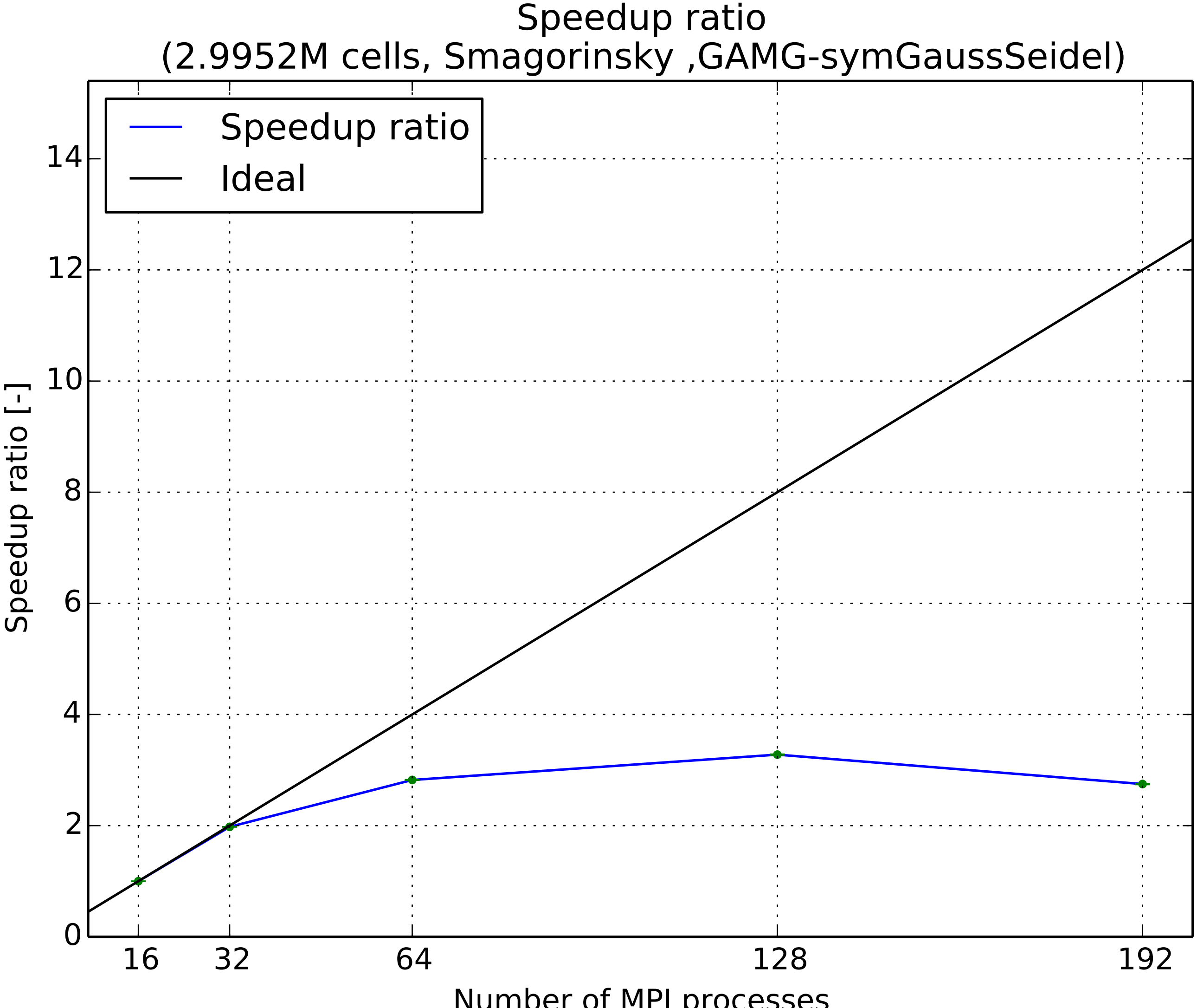
128
192
Number of MPI processes


Speedup ratio
(2.9952M cells, Smagorinsky ,GAMG-symGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
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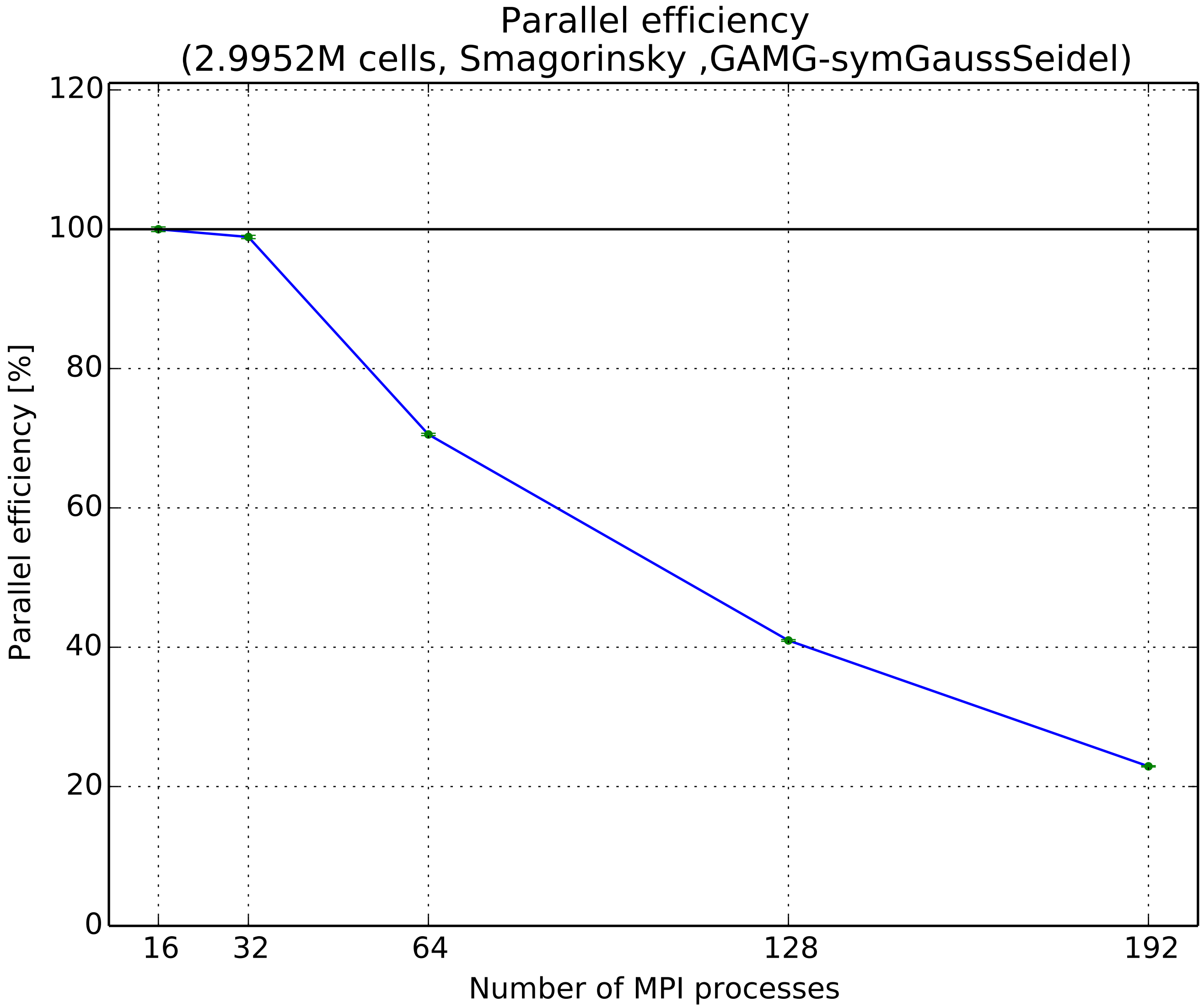
128
192
Number of MPI processes


Parallel efficiency
(2.9952M cells, Smagorinsky ,GAMG-symGaussSeidel)
Parallel efficiency [%]
0
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80
100
120
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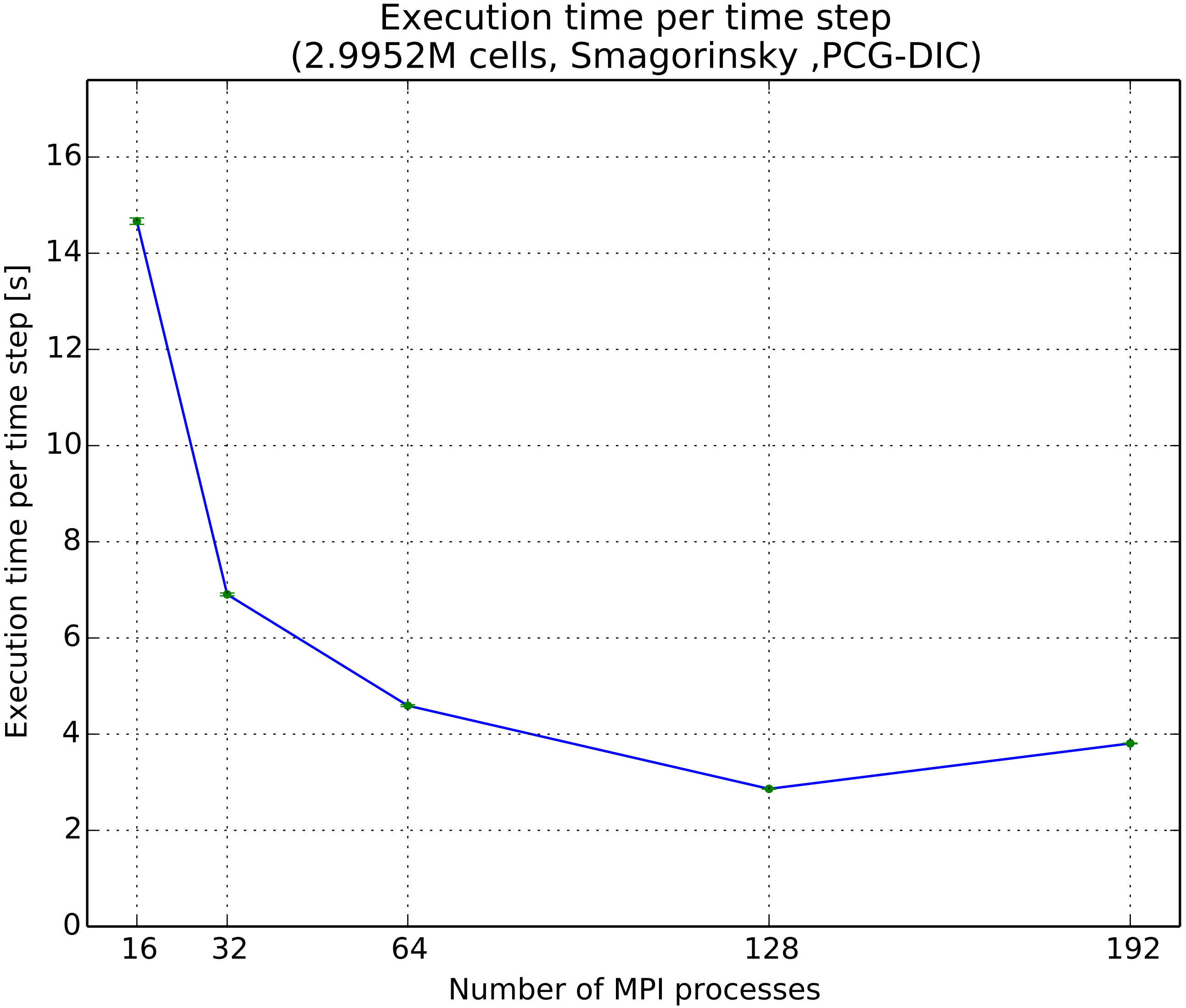
128
192
Number of MPI processes


Execution time per time step
(2.9952M cells, Smagorinsky ,PCG-DIC)
Execution time per time step [s]
0
2
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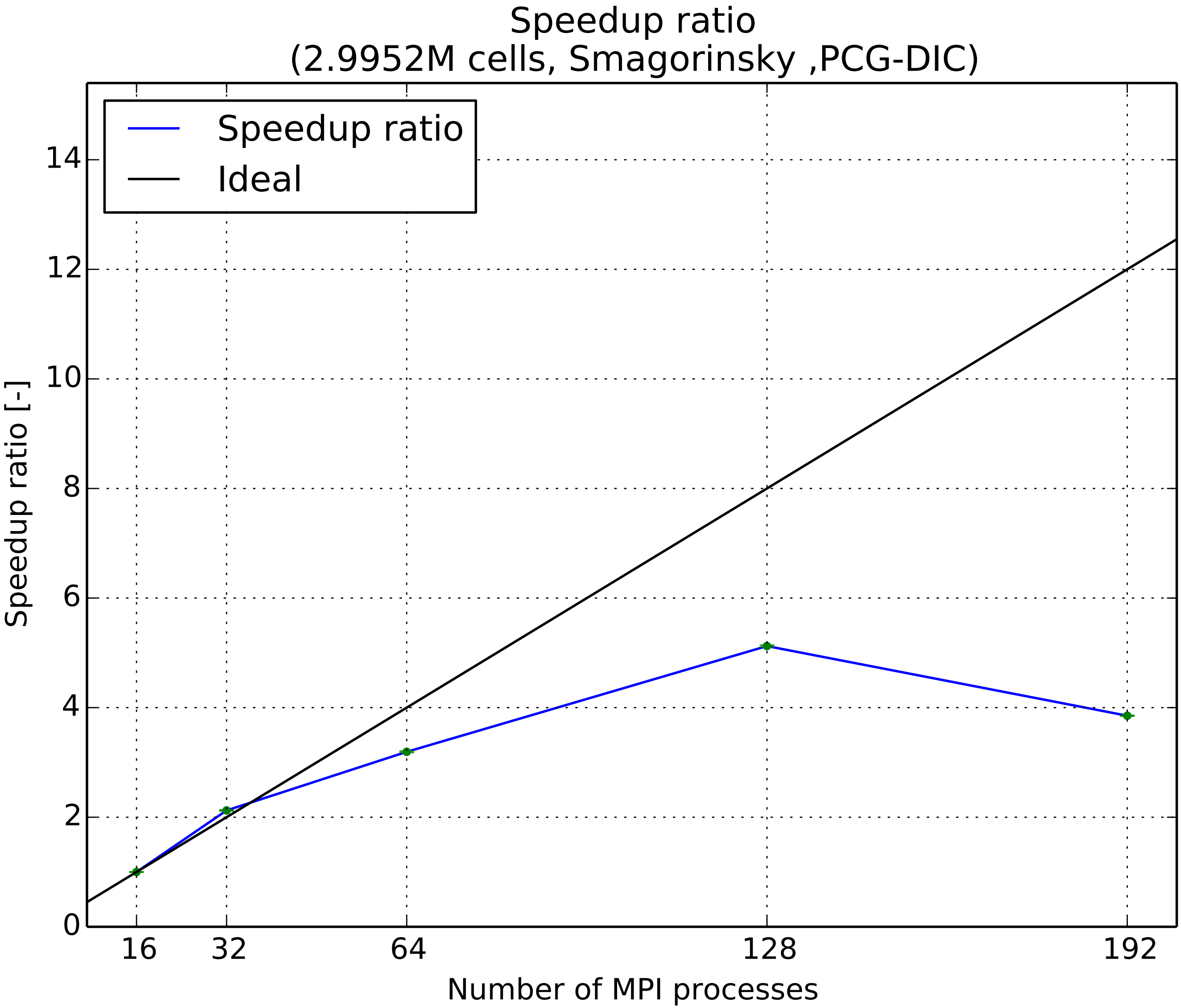
16
16
32
64
128
192
Number of MPI processes


Speedup ratio
(2.9952M cells, Smagorinsky ,PCG-DIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
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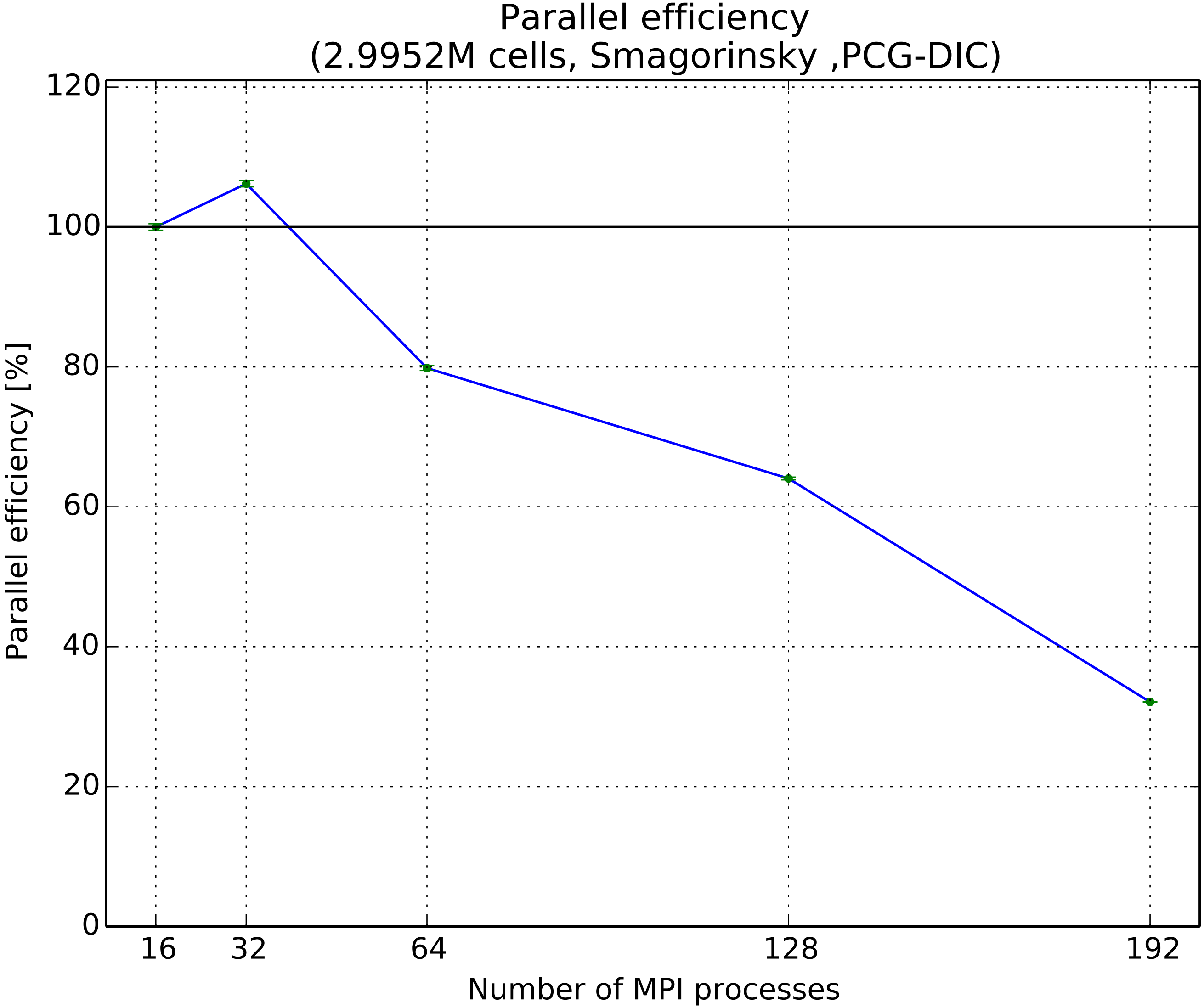
128
192
Number of MPI processes


Parallel efficiency
(2.9952M cells, Smagorinsky ,PCG-DIC)
Parallel efficiency [%]
Number of MPI processes
0
20
40
60
80
100
120
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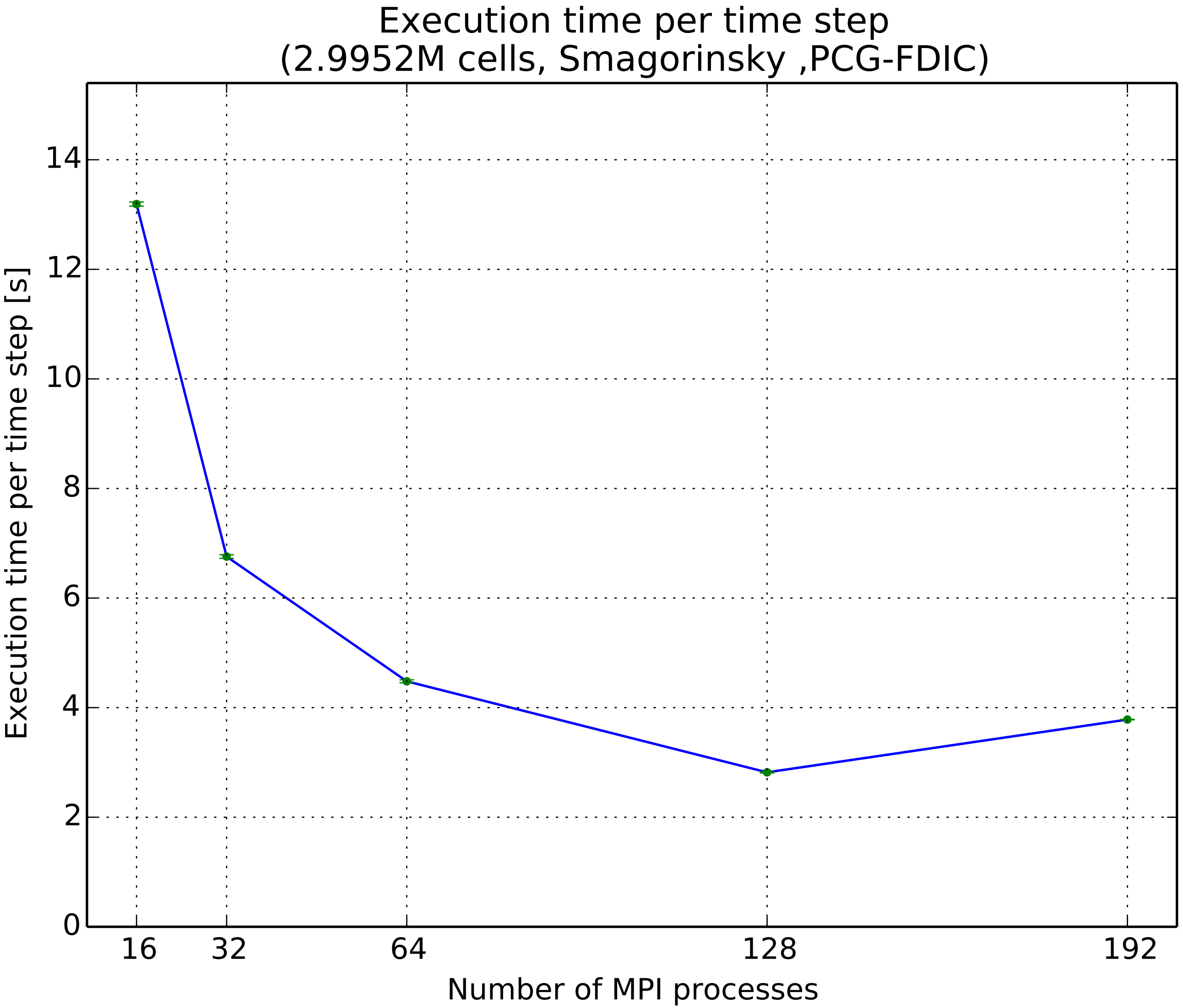
32
64
128
192


Execution time per time step
(2.9952M cells, Smagorinsky ,PCG-FDIC)
Execution time per time step [s]
0
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32
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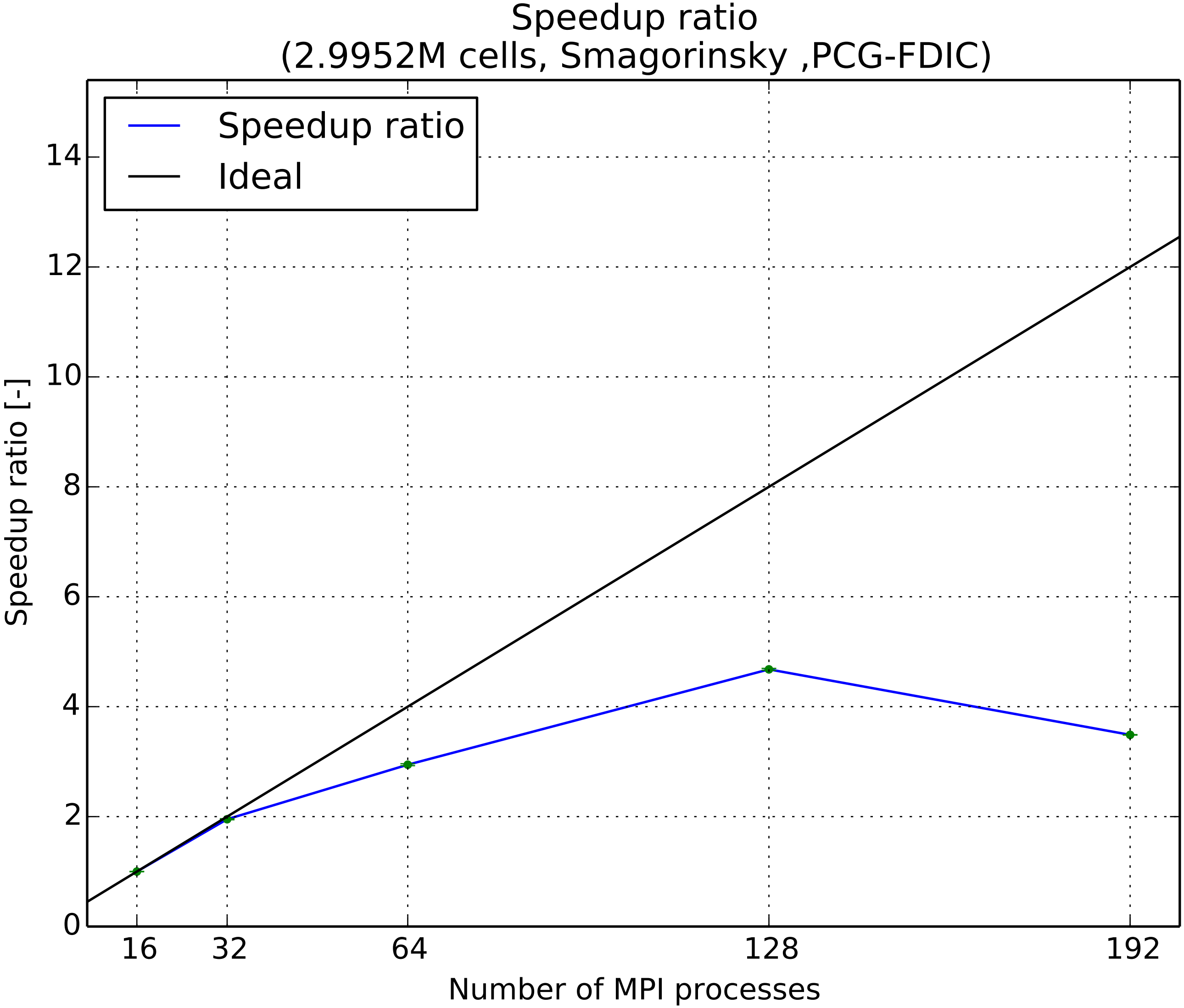
128
192
Number of MPI processes


Speedup ratio
(2.9952M cells, Smagorinsky ,PCG-FDIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
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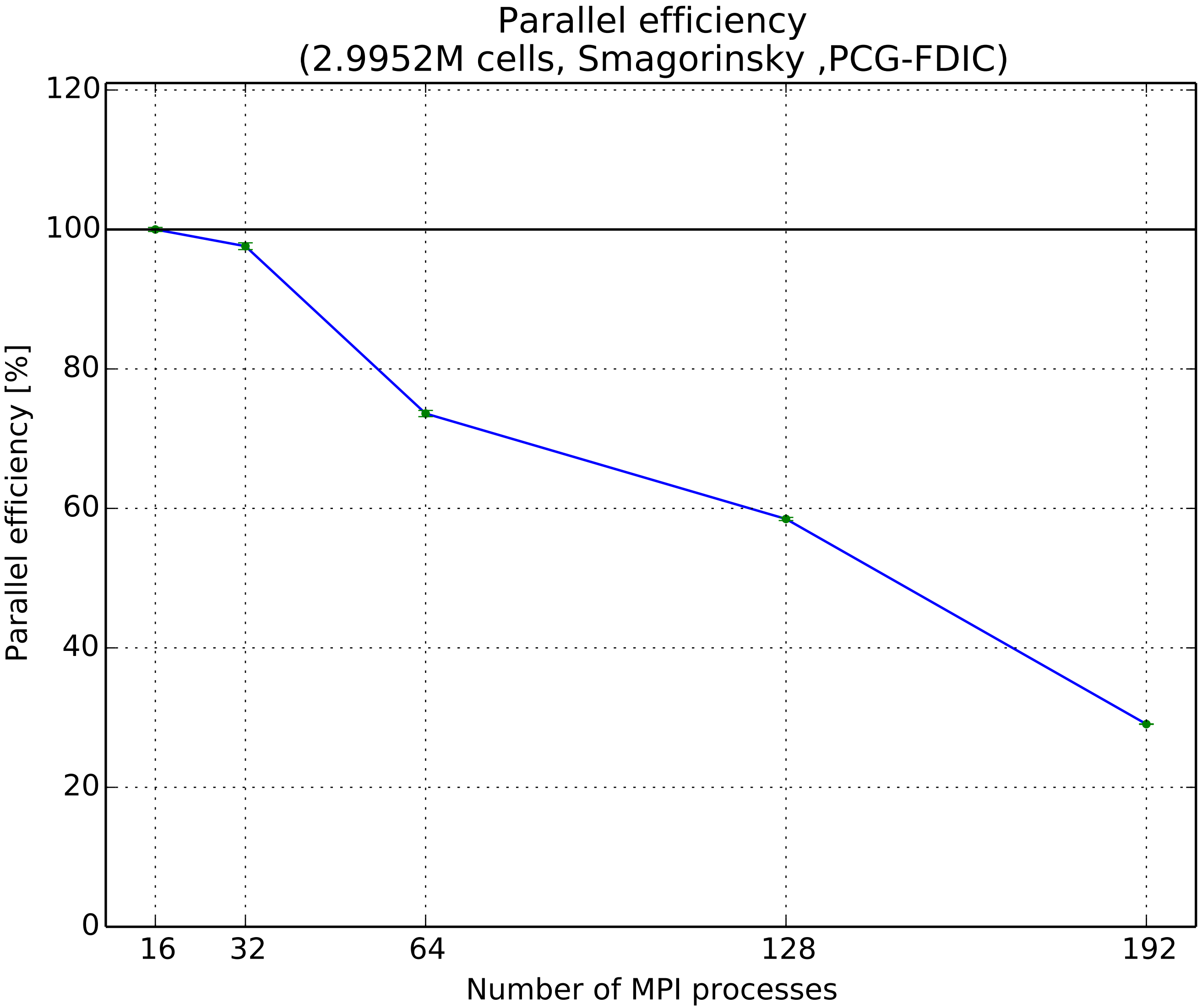
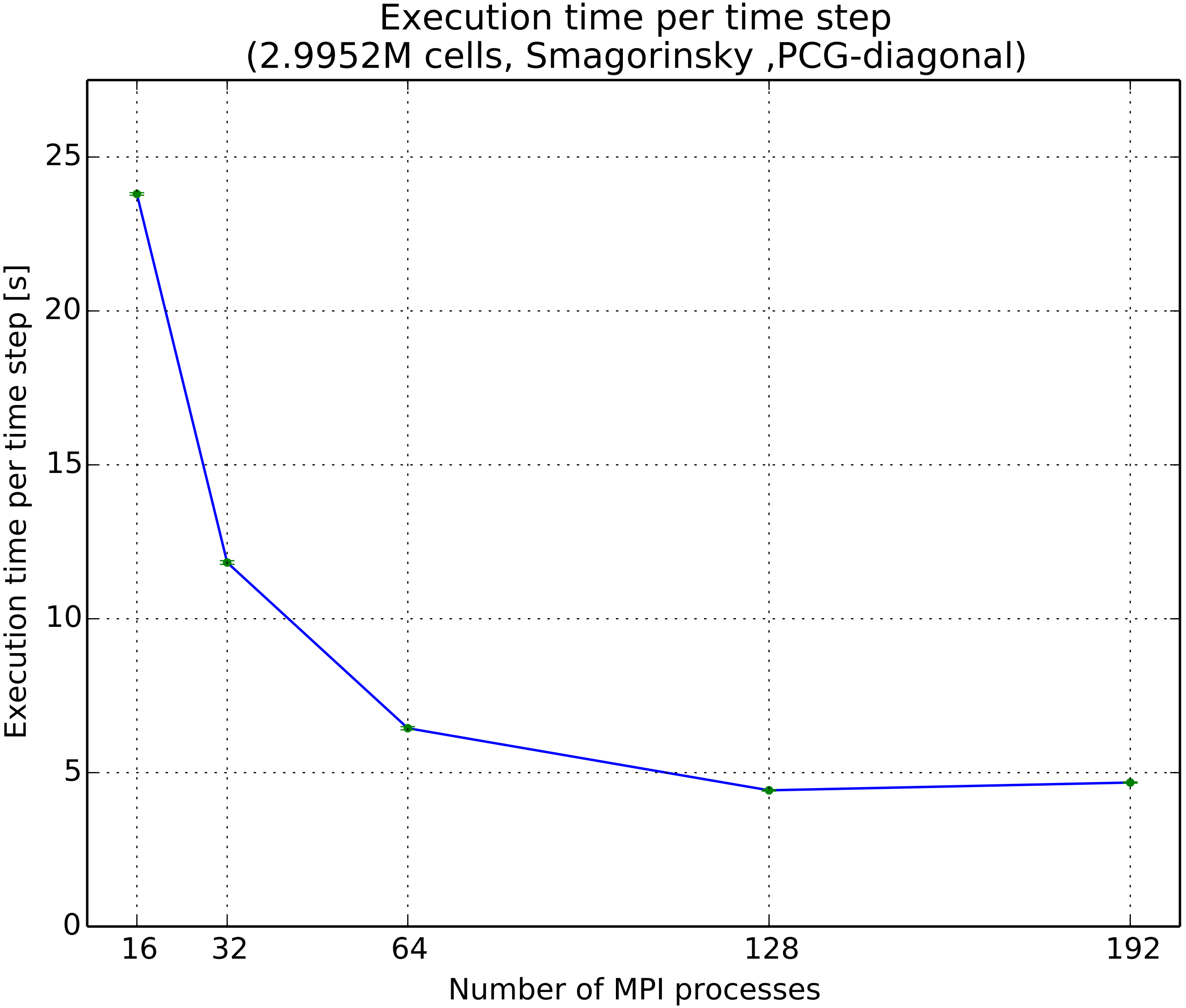
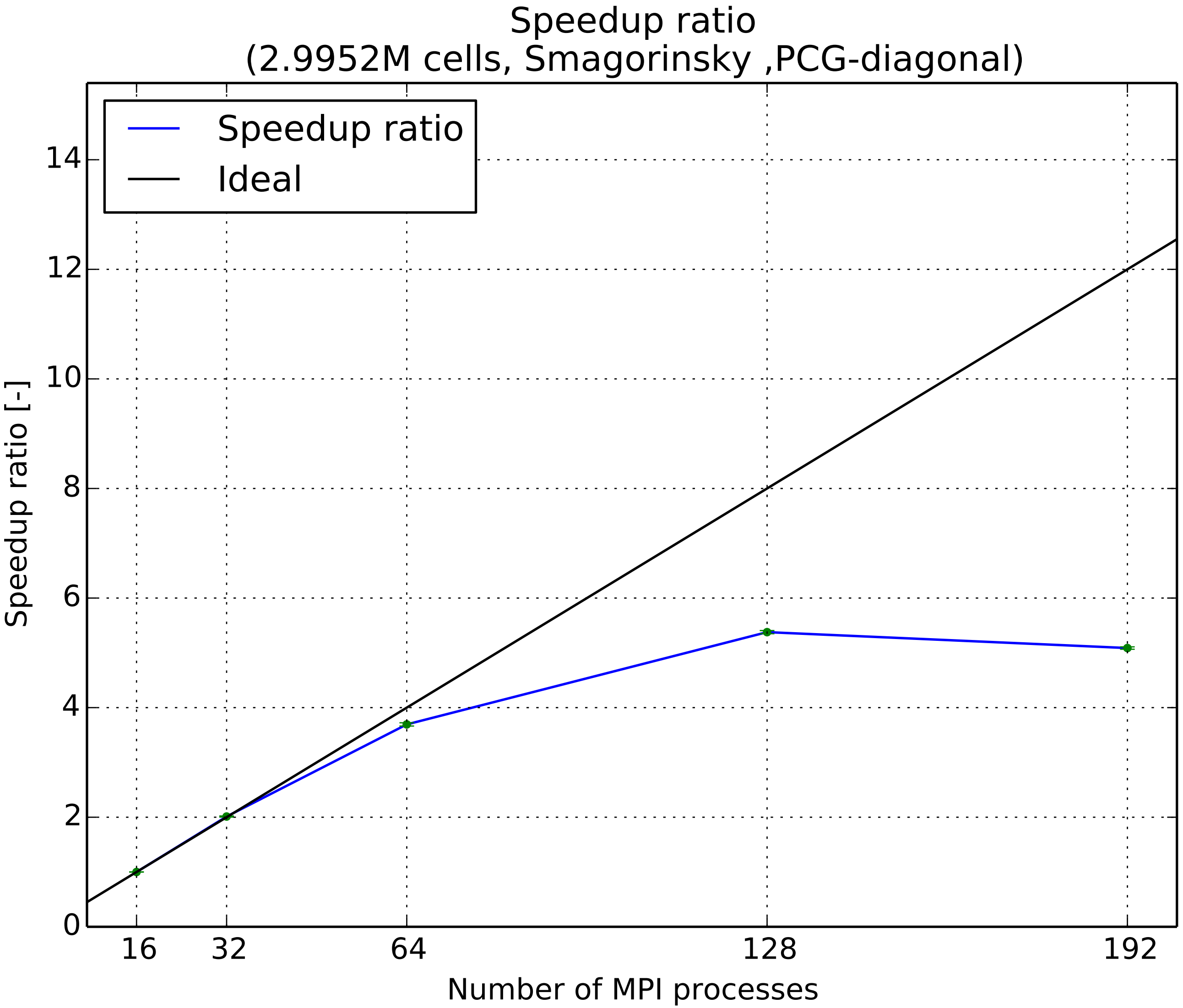
14
16
32
64
128
192
Number of MPI processes


Parallel efficiency
(2.9952M cells, Smagorinsky ,PCG-FDIC)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes



Execution time per time step
(2.9952M cells, Smagorinsky ,PCG-diagonal)


Speedup ratio
(2.9952M cells, Smagorinsky ,PCG-diagonal)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
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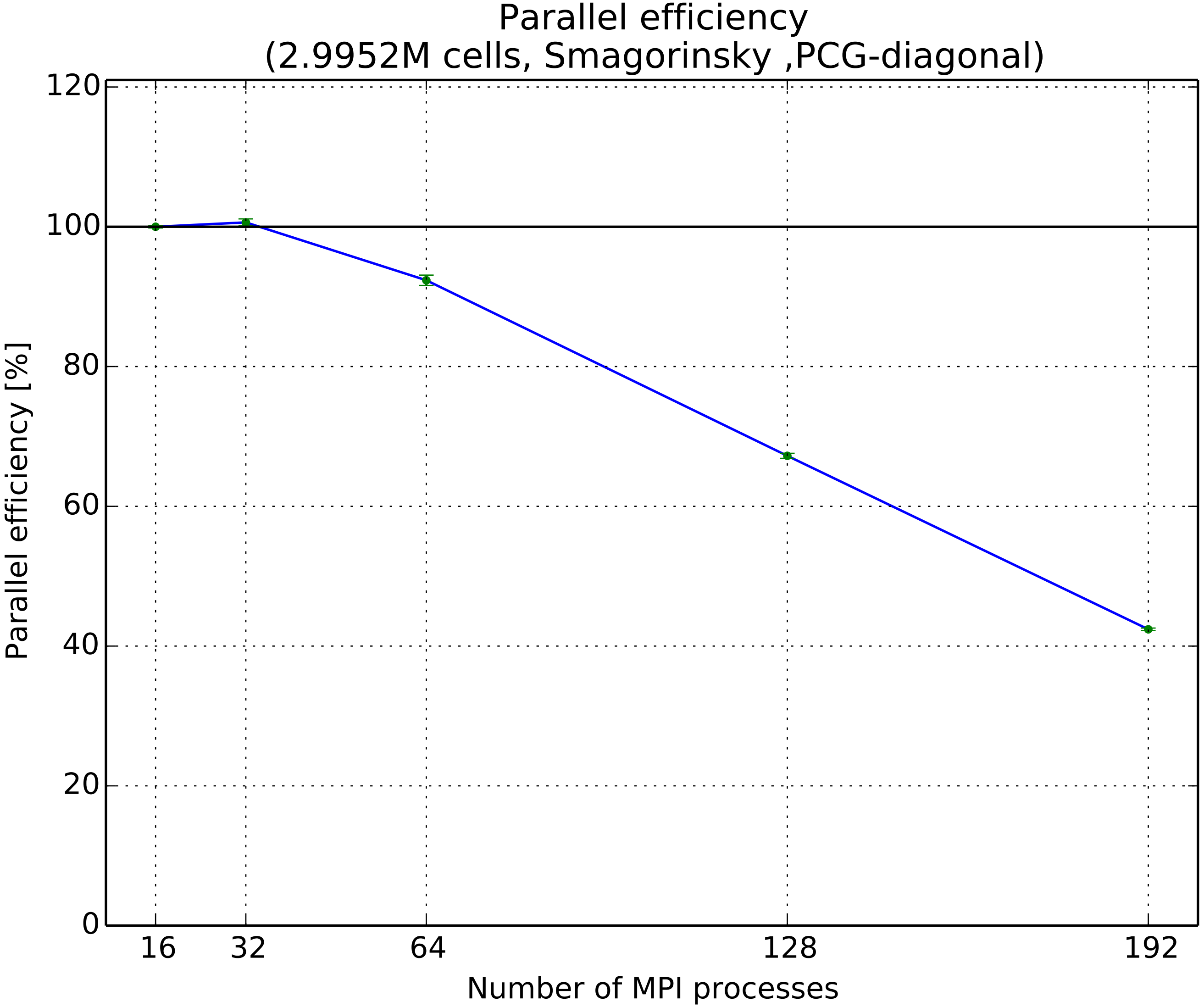
14
16
32
64
128
192
Number of MPI processes


Parallel efficiency
(2.9952M cells, Smagorinsky ,PCG-diagonal)
Parallel efficiency [%]
0
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60
80
100
120
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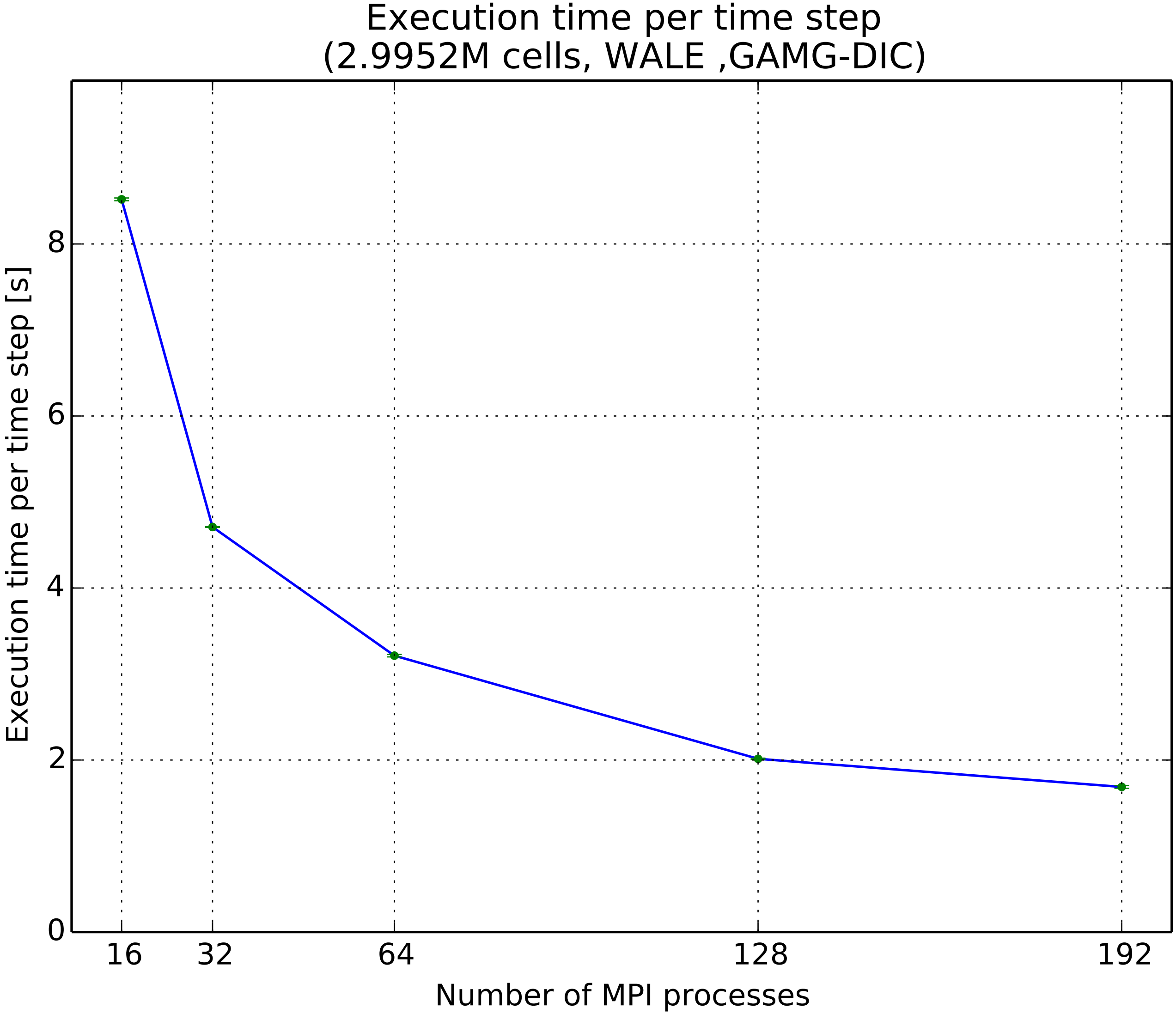
128
192
Number of MPI processes


Execution time per time step
(2.9952M cells, WALE ,GAMG-DIC)
Execution time per time step [s]
0
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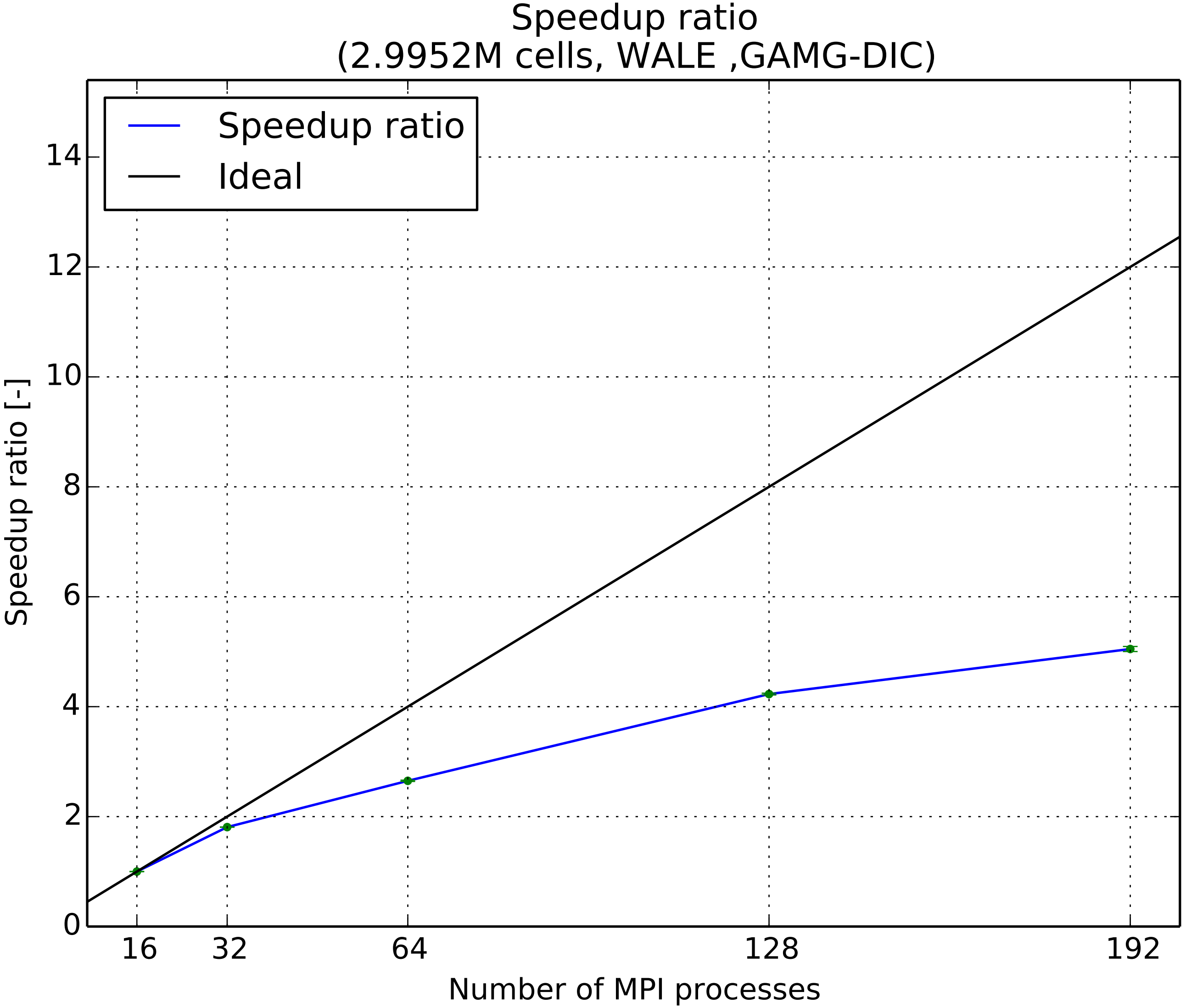
128
192
Number of MPI processes


Speedup ratio
(2.9952M cells, WALE ,GAMG-DIC)
Speedup ratio
Ideal
Speedup ratio [-]
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128
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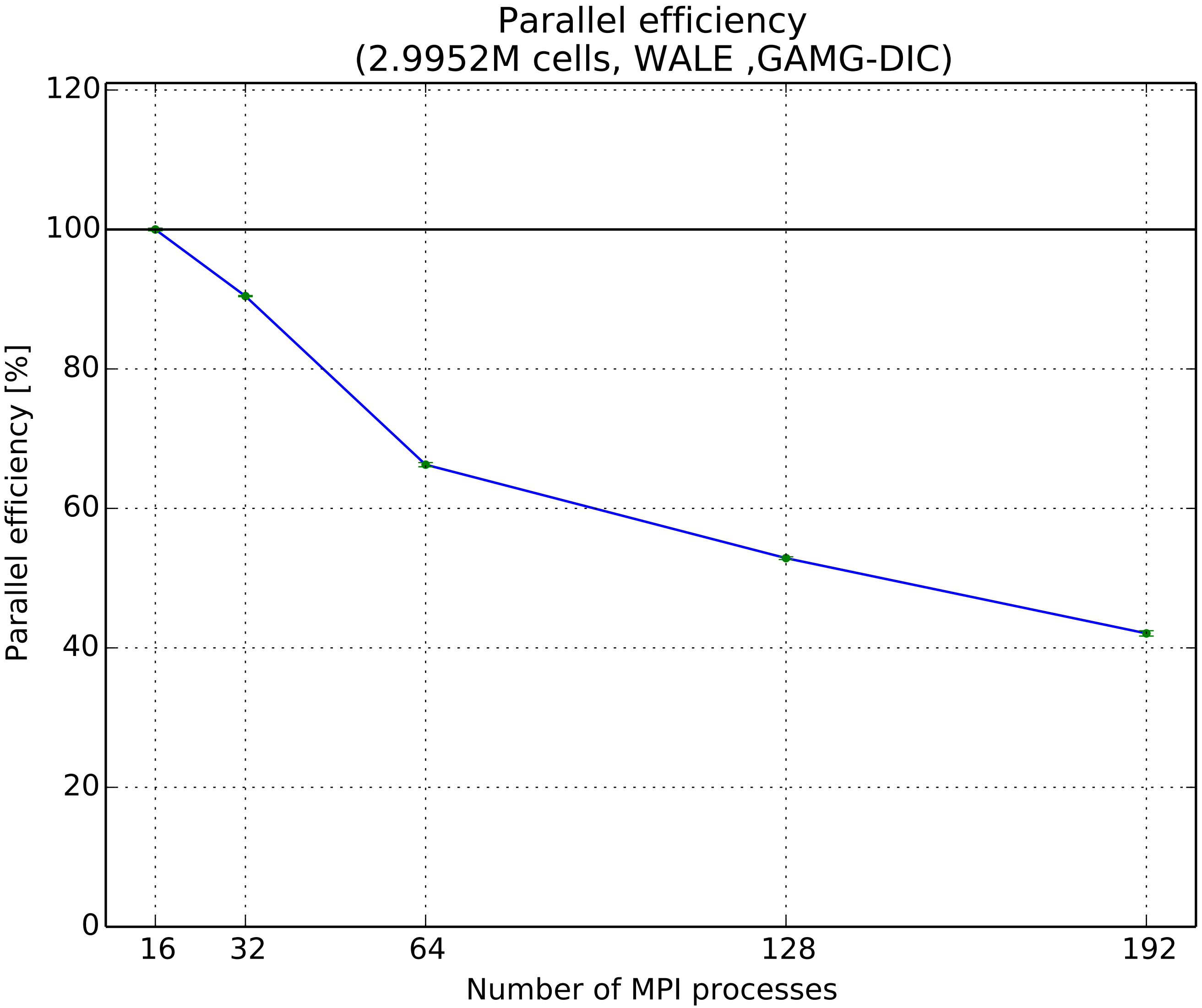
Number of MPI processes


Parallel efficiency
(2.9952M cells, WALE ,GAMG-DIC)
Parallel efficiency [%]
0
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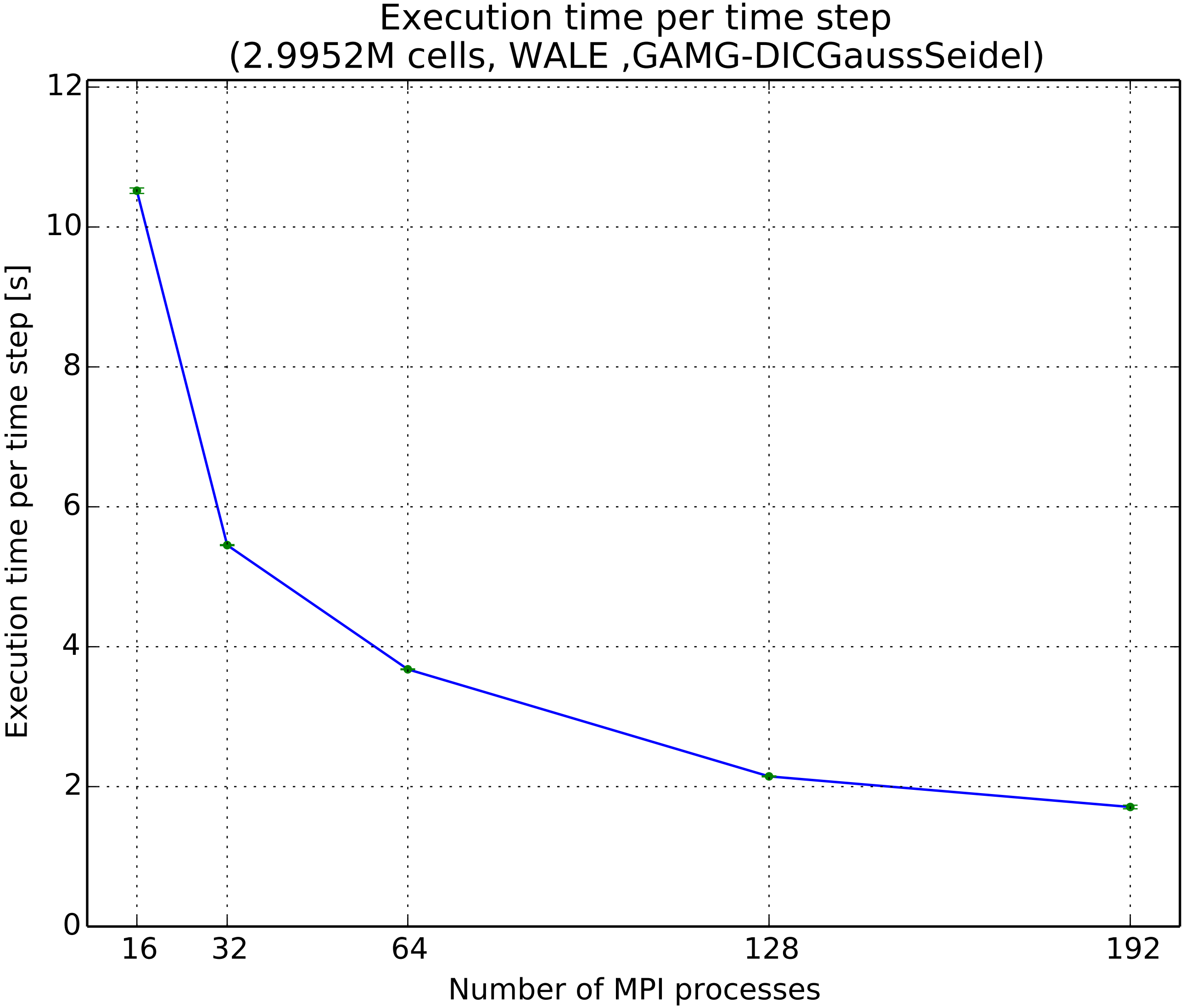
Number of MPI processes


Execution time per time step
(2.9952M cells, WALE ,GAMG-DICGaussSeidel)
Execution time per time step [s]
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128
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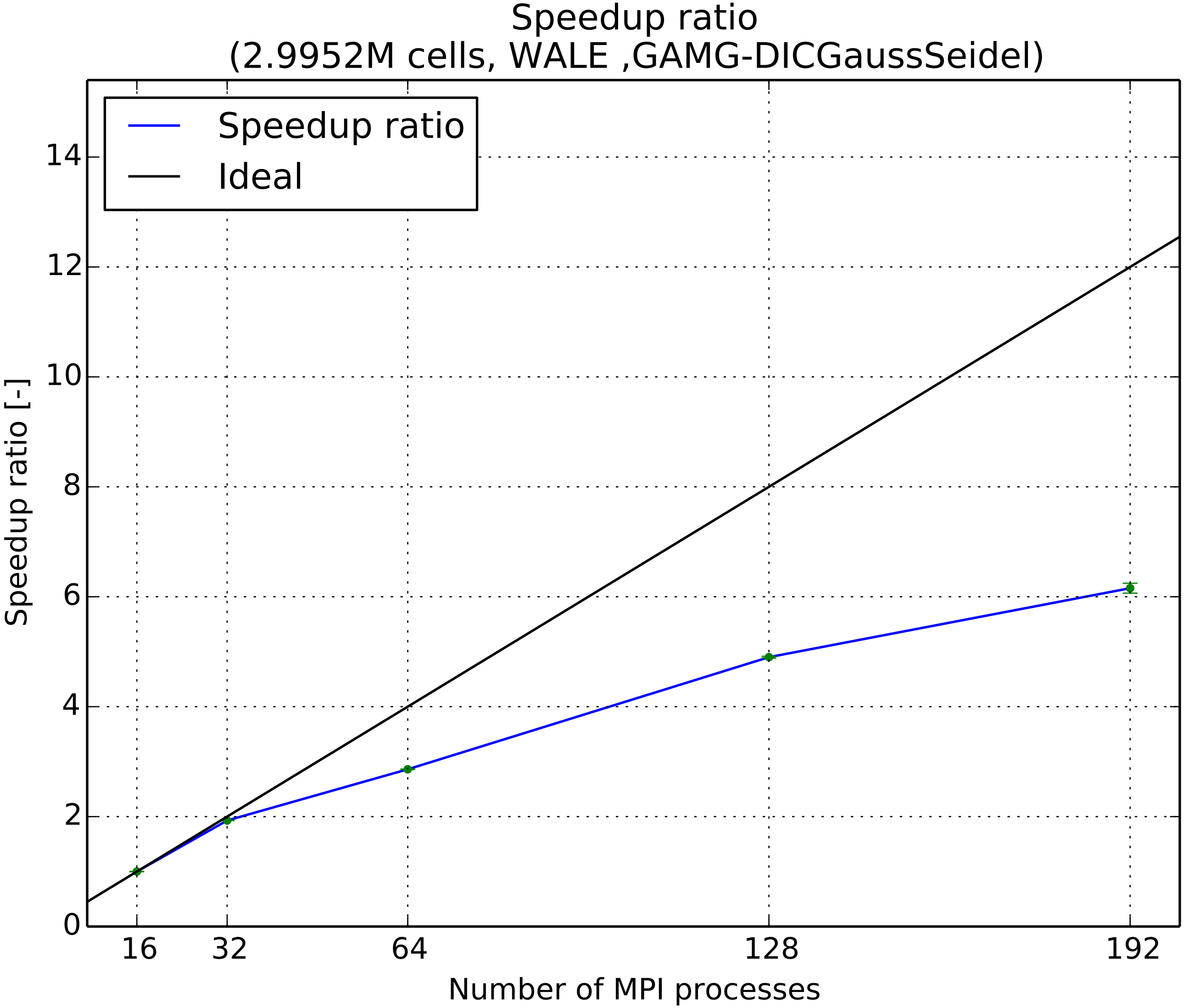
Number of MPI processes


Speedup ratio
(2.9952M cells, WALE ,GAMG-DICGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
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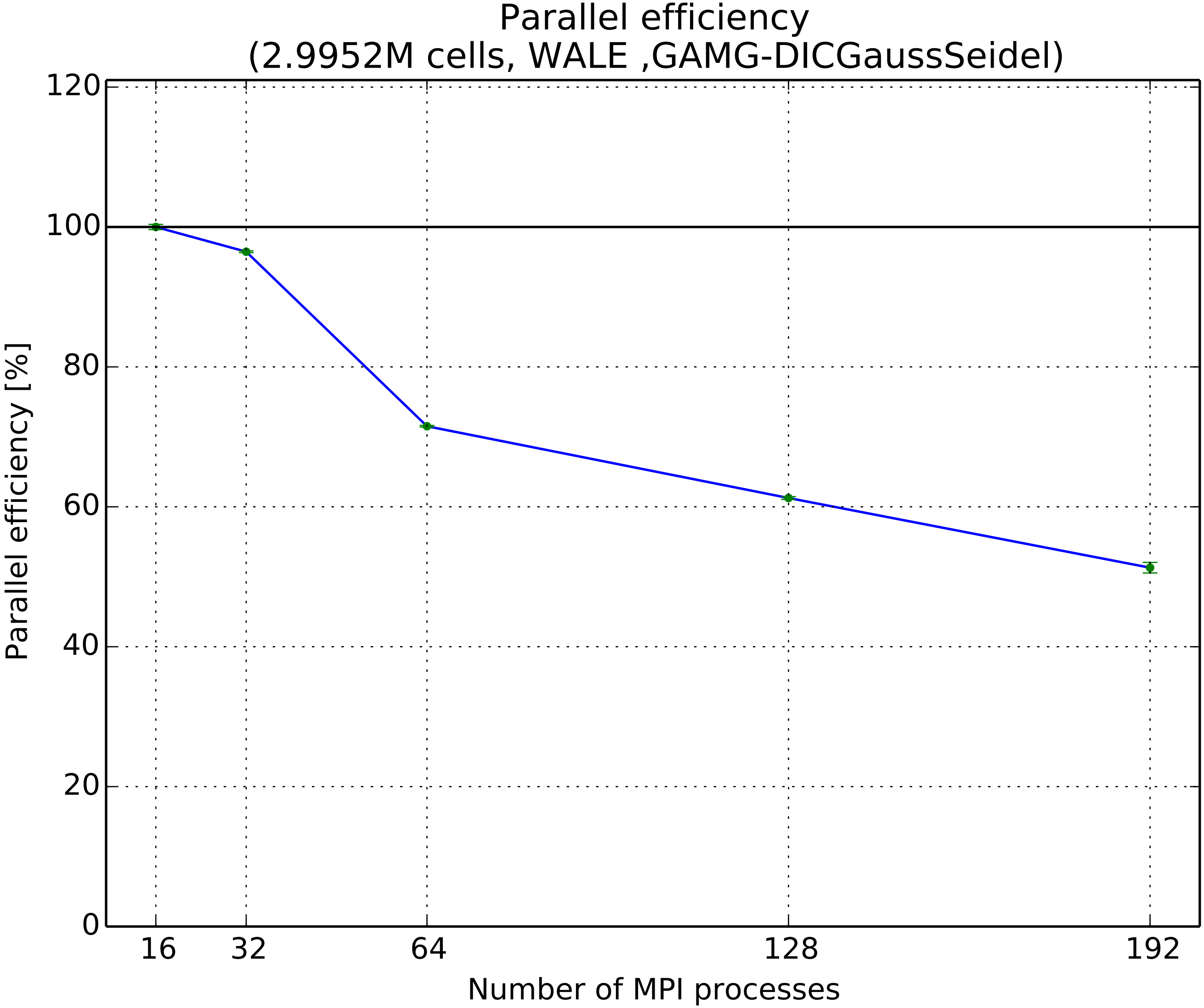
Number of MPI processes


Parallel efficiency
(2.9952M cells, WALE ,GAMG-DICGaussSeidel)
Parallel efficiency [%]
0
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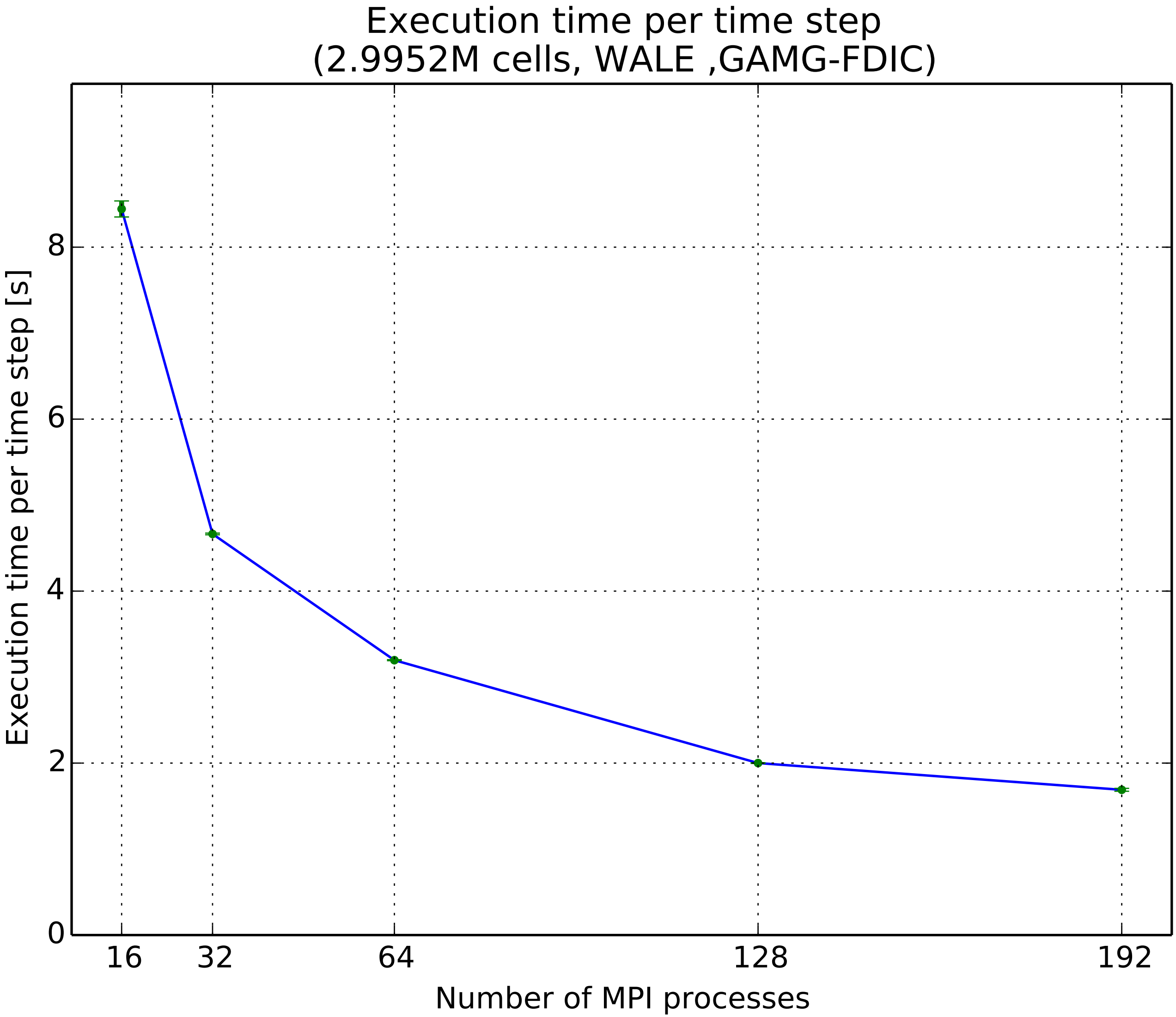
Number of MPI processes


Execution time per time step
(2.9952M cells, WALE ,GAMG-FDIC)
Execution time per time step [s]
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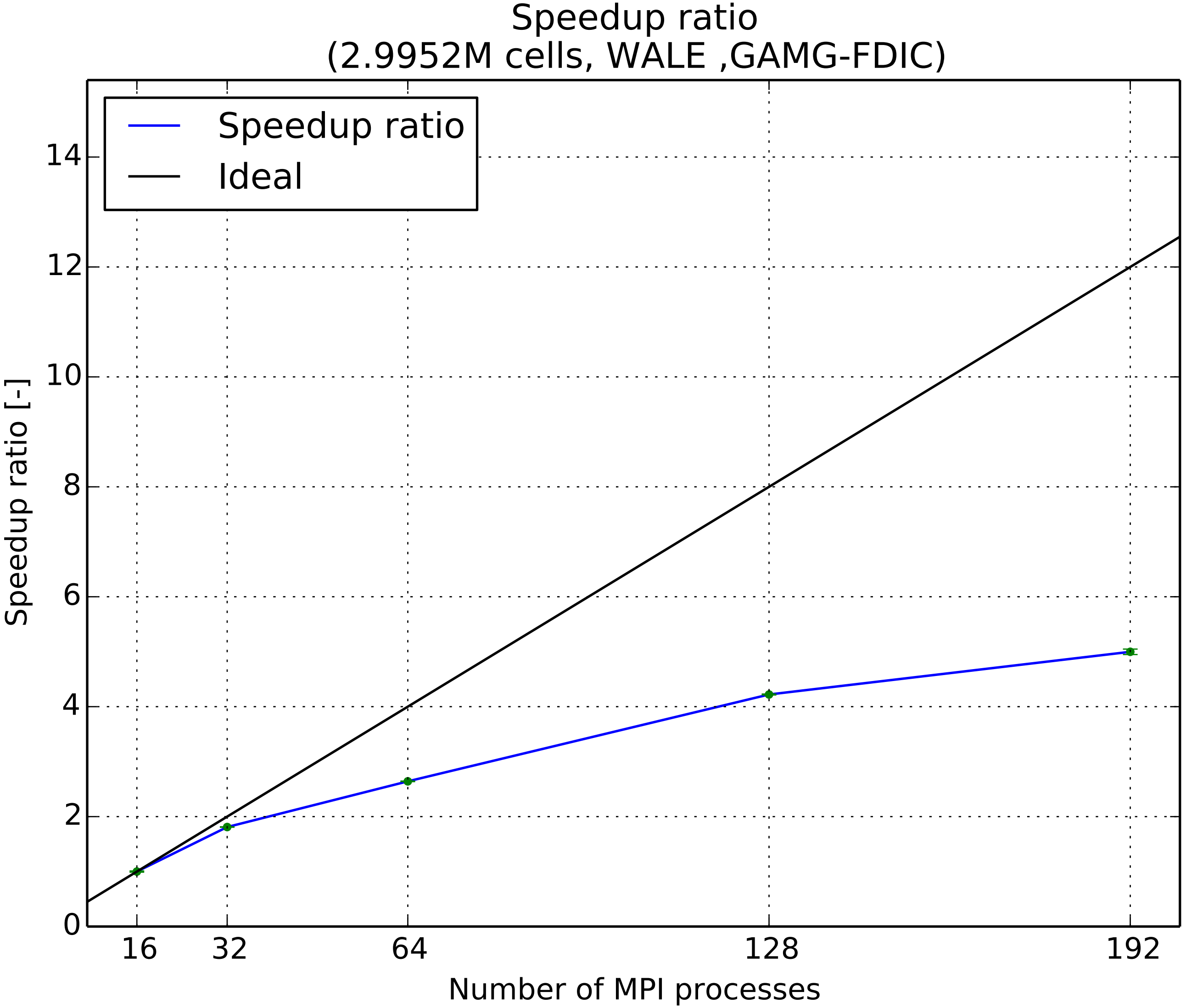
Number of MPI processes


Speedup ratio
(2.9952M cells, WALE ,GAMG-FDIC)
Speedup ratio
Ideal
Speedup ratio [-]
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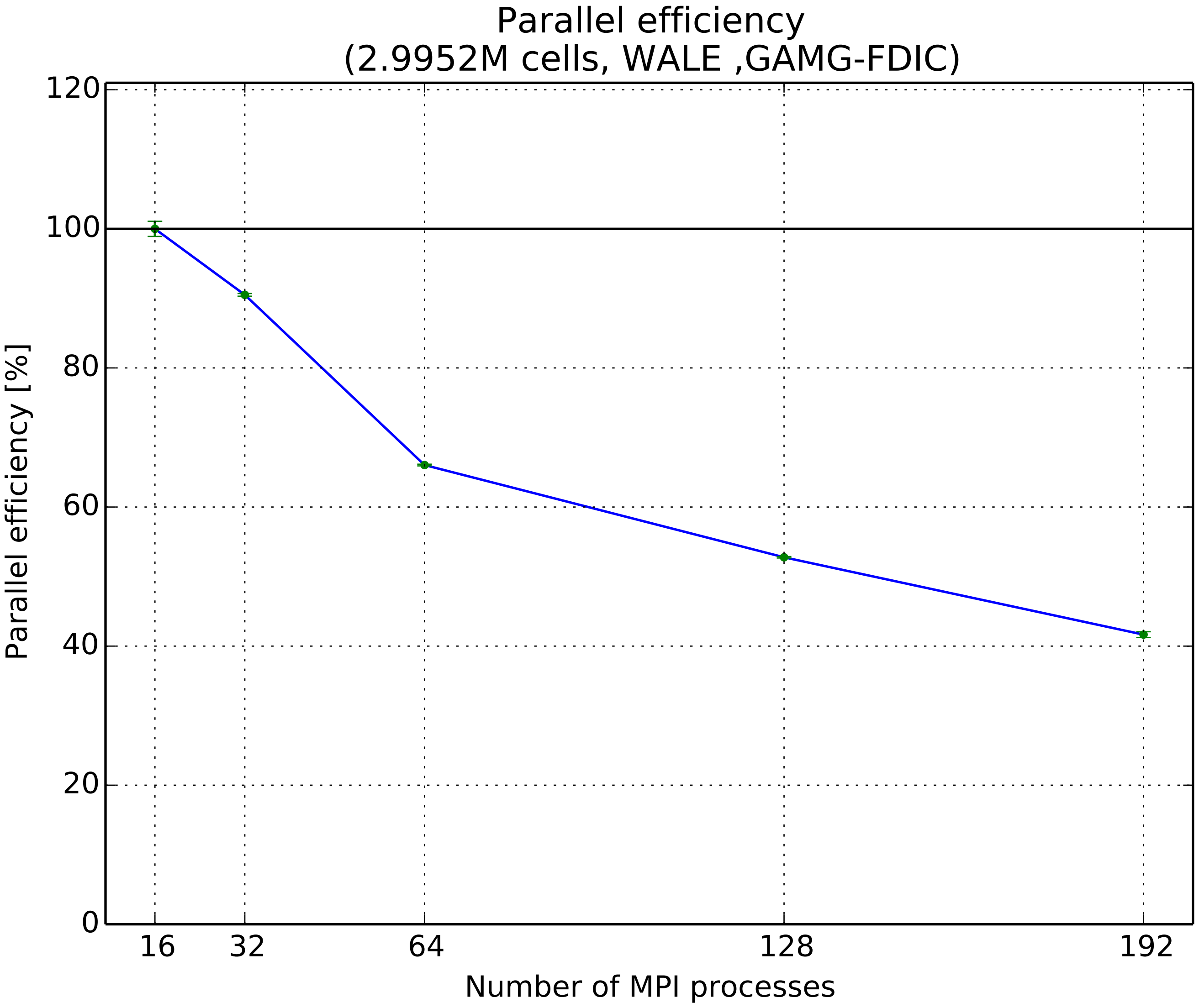
Number of MPI processes


Parallel efficiency
(2.9952M cells, WALE ,GAMG-FDIC)
Parallel efficiency [%]
0
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128
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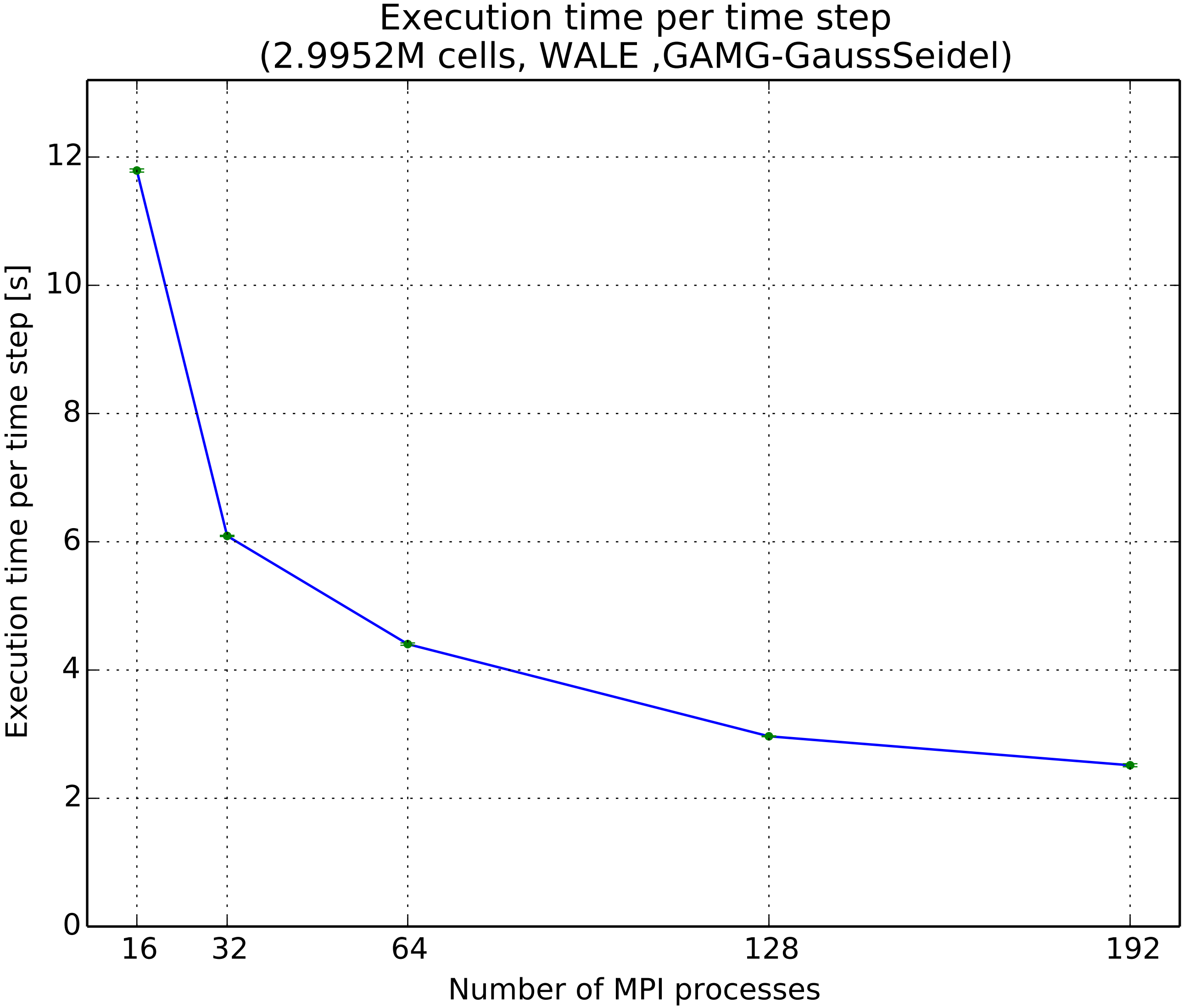
Number of MPI processes


Execution time per time step
(2.9952M cells, WALE ,GAMG-GaussSeidel)
Execution time per time step [s]
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128
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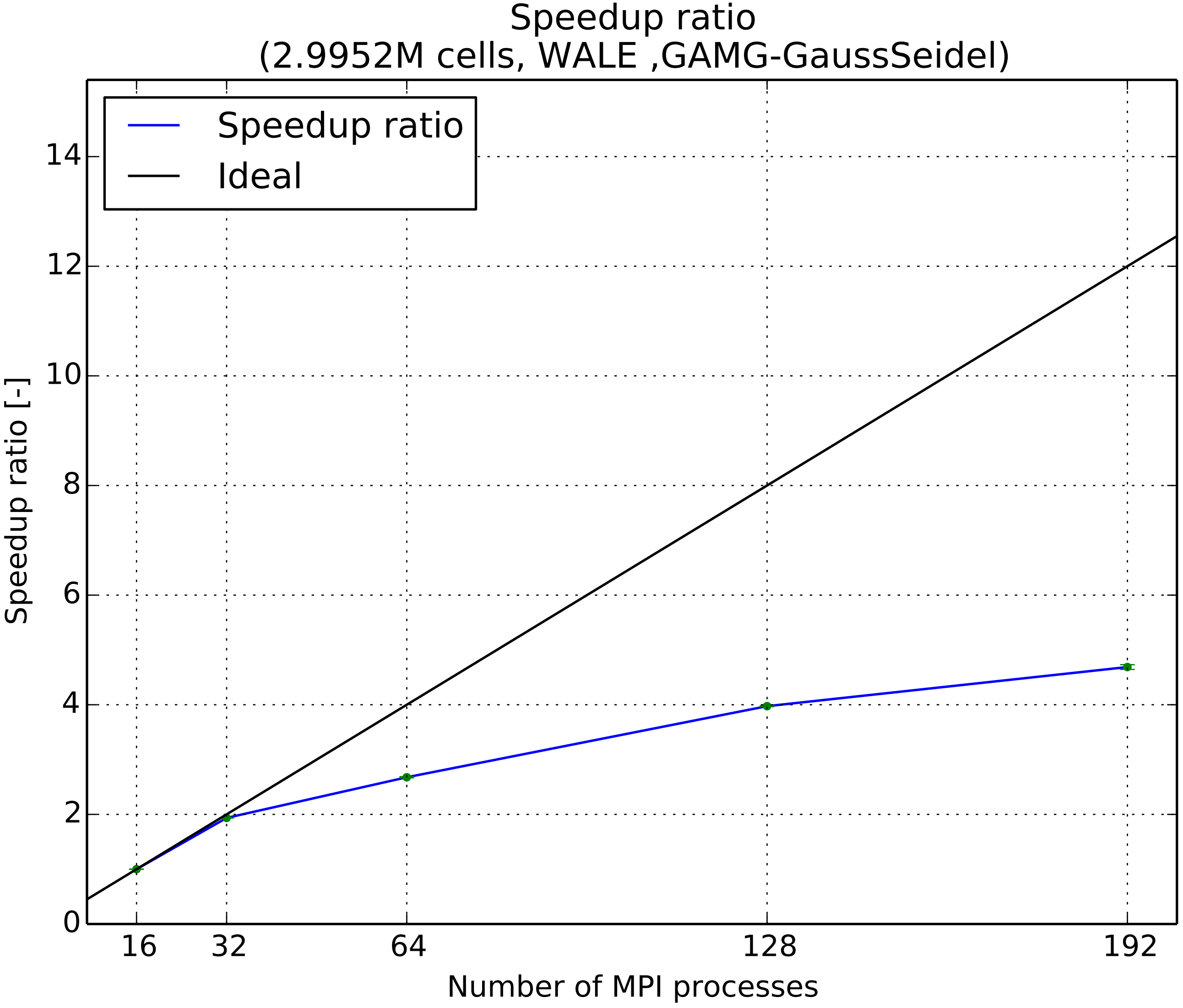
Number of MPI processes


Speedup ratio
(2.9952M cells, WALE ,GAMG-GaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
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128
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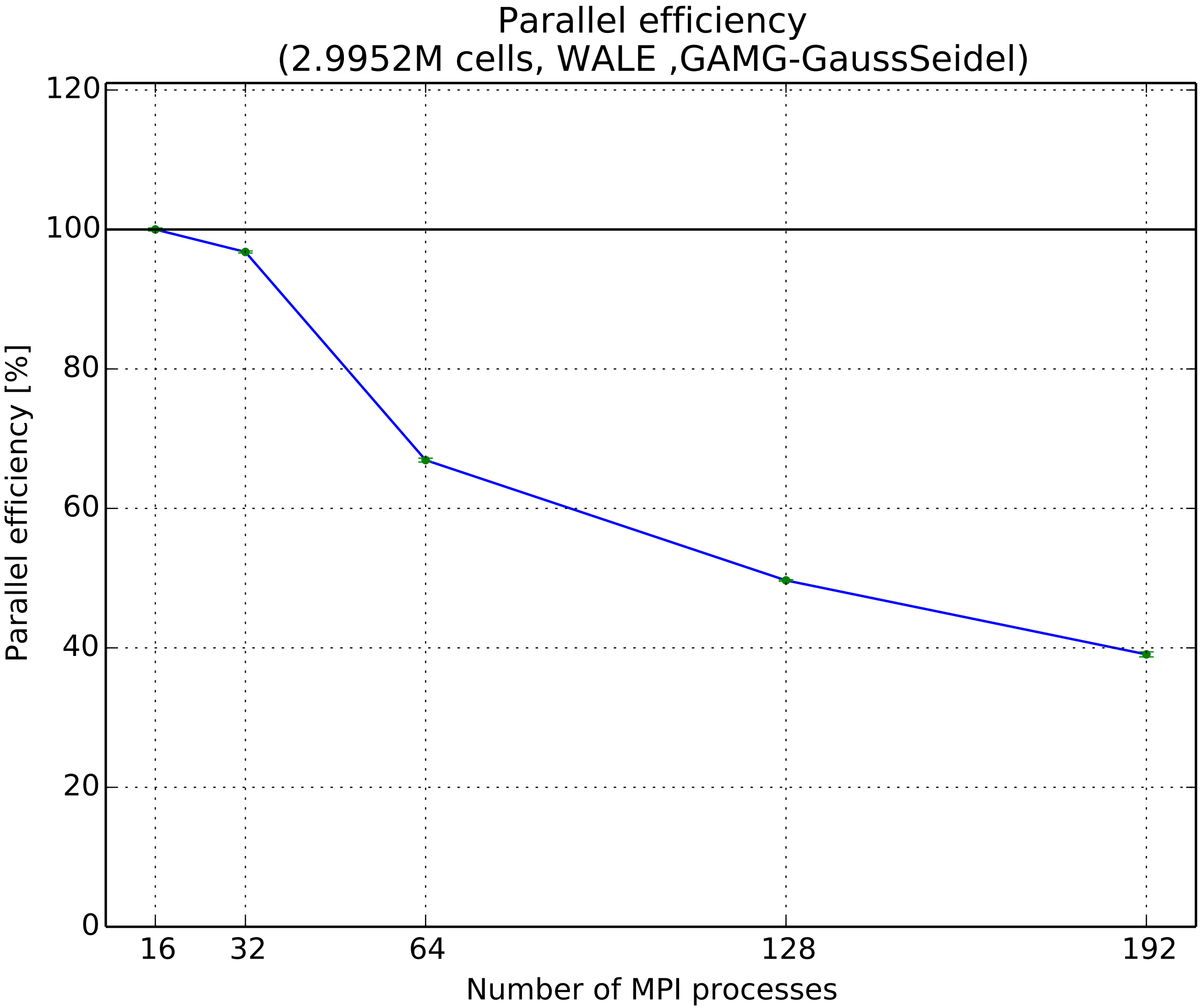
Number of MPI processes


Parallel efficiency
(2.9952M cells, WALE ,GAMG-GaussSeidel)
Parallel efficiency [%]
Number of MPI processes
0
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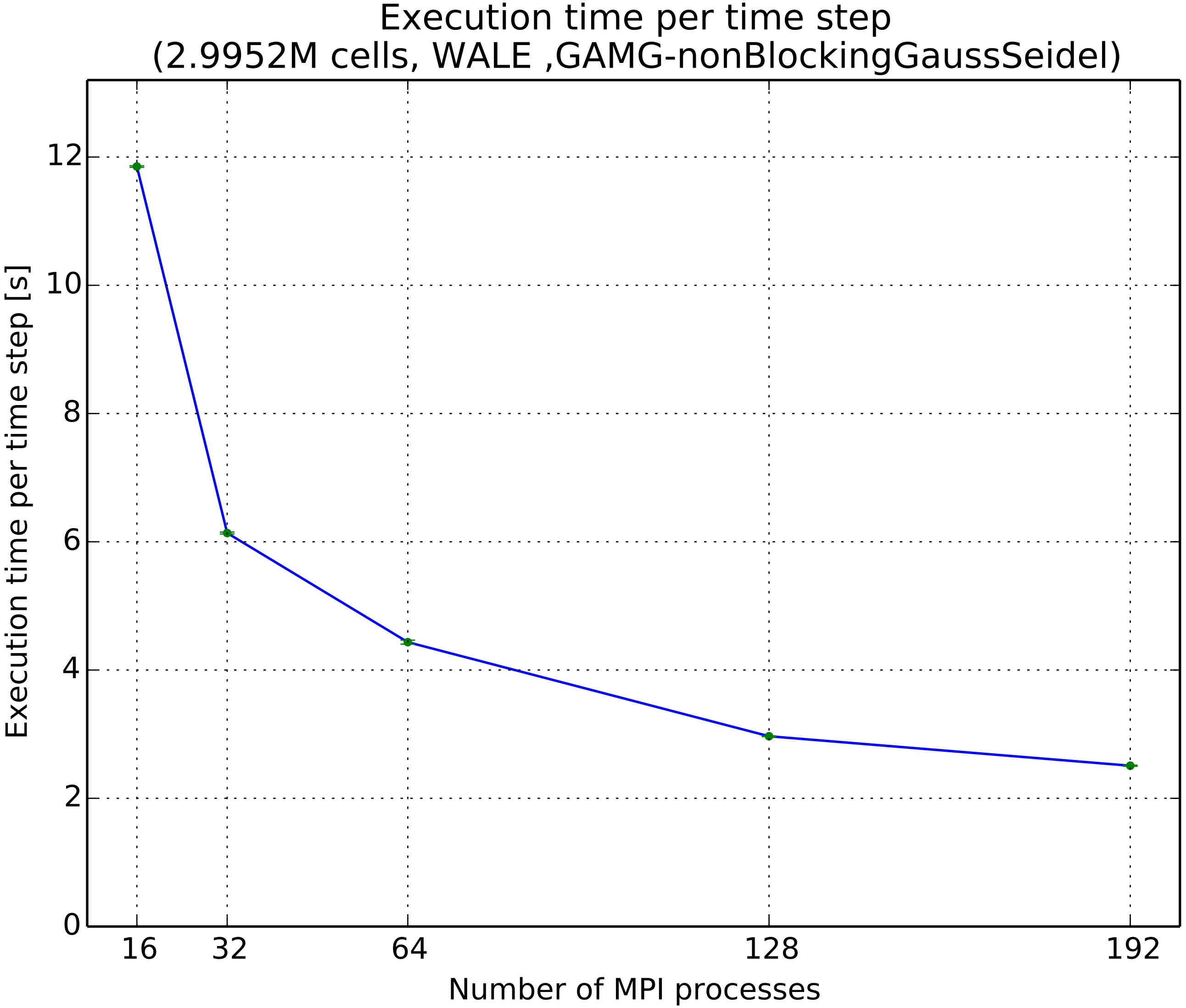
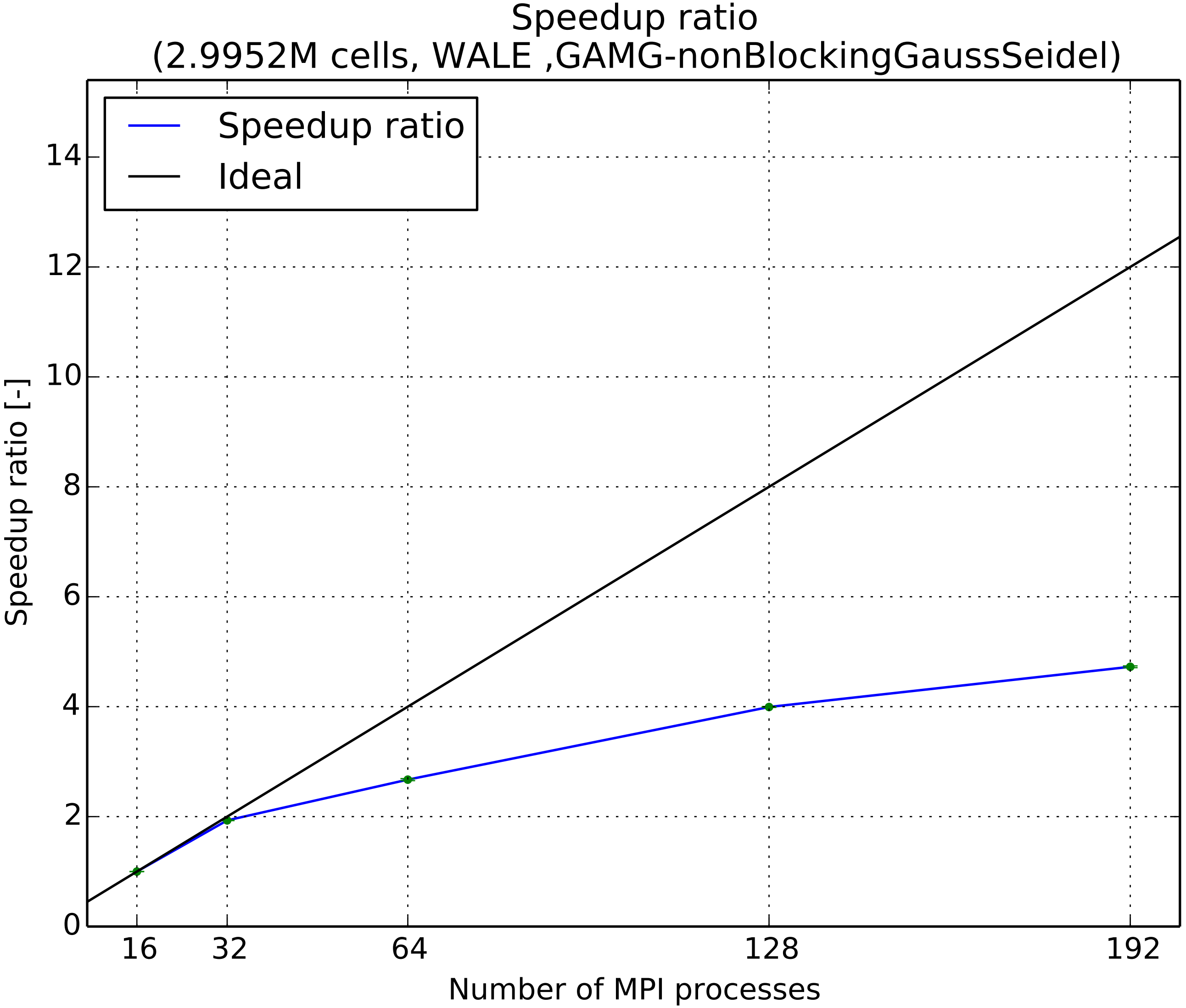


Execution time per time step
(2.9952M cells, WALE ,GAMG-nonBlockingGaussSeidel)


Speedup ratio
(2.9952M cells, WALE ,GAMG-nonBlockingGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
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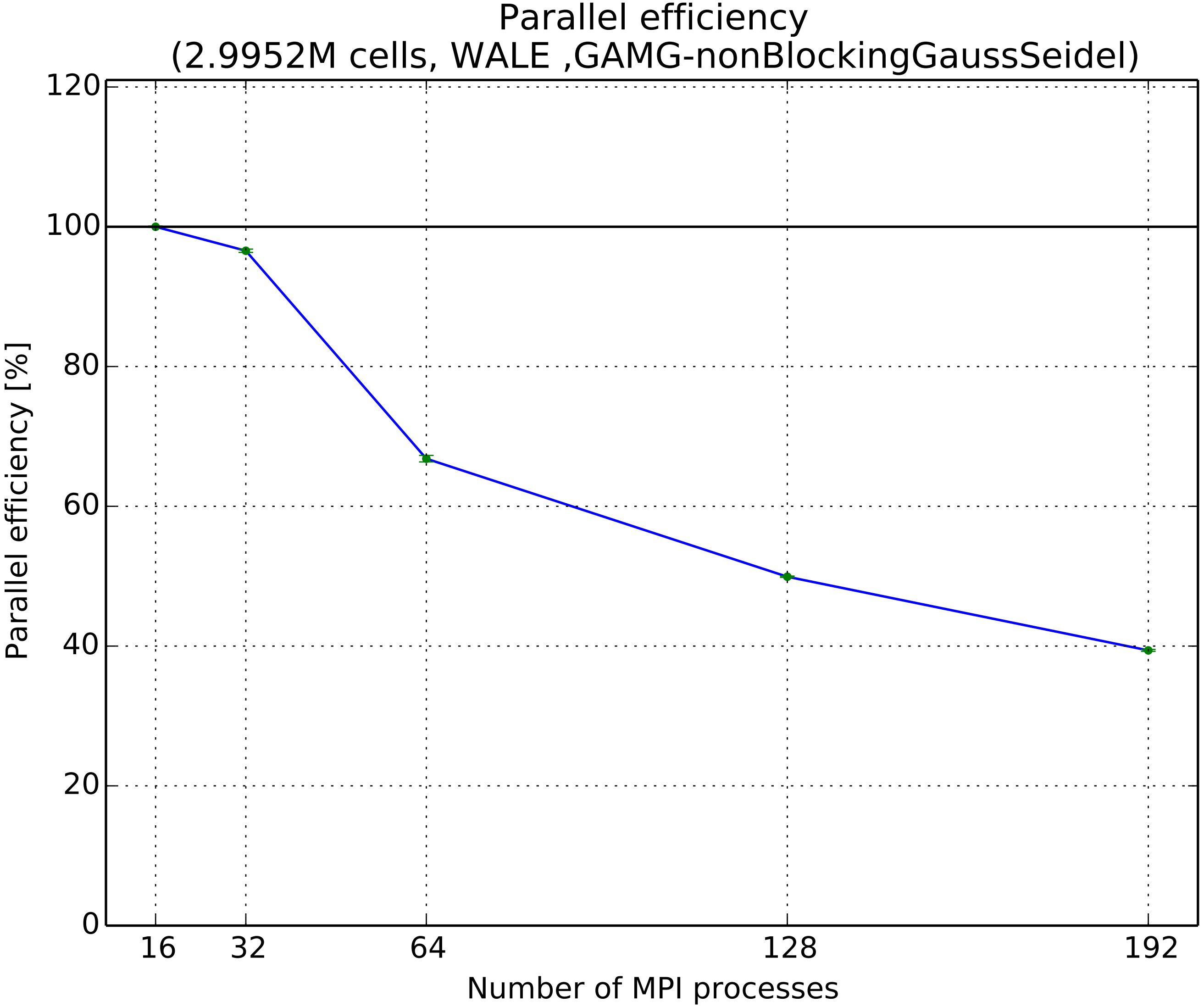
128
192
Number of MPI processes


Parallel efficiency
(2.9952M cells, WALE ,GAMG-nonBlockingGaussSeidel)
Parallel efficiency [%]
0
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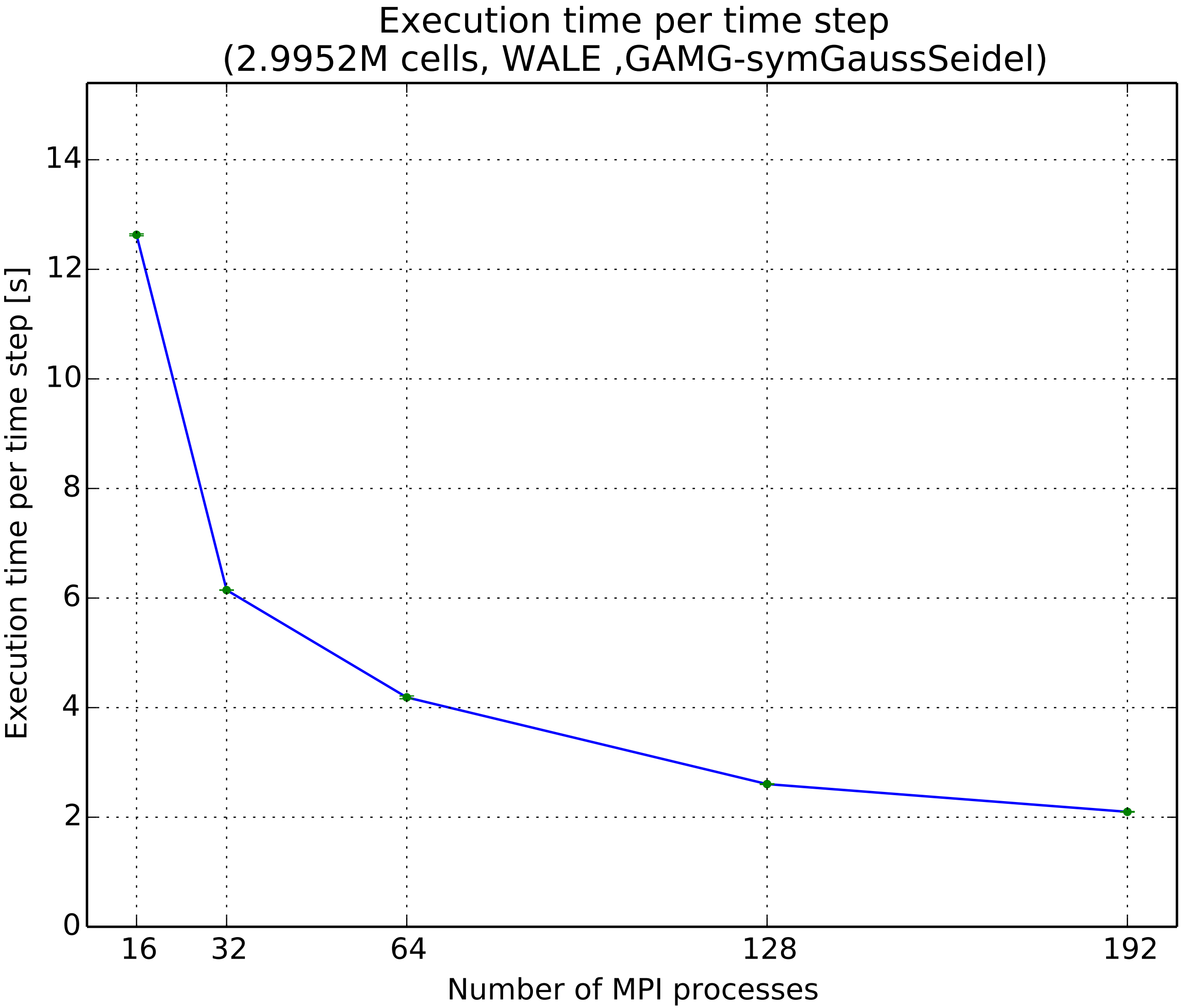
128
192
Number of MPI processes


Execution time per time step
(2.9952M cells, WALE ,GAMG-symGaussSeidel)
Execution time per time step [s]
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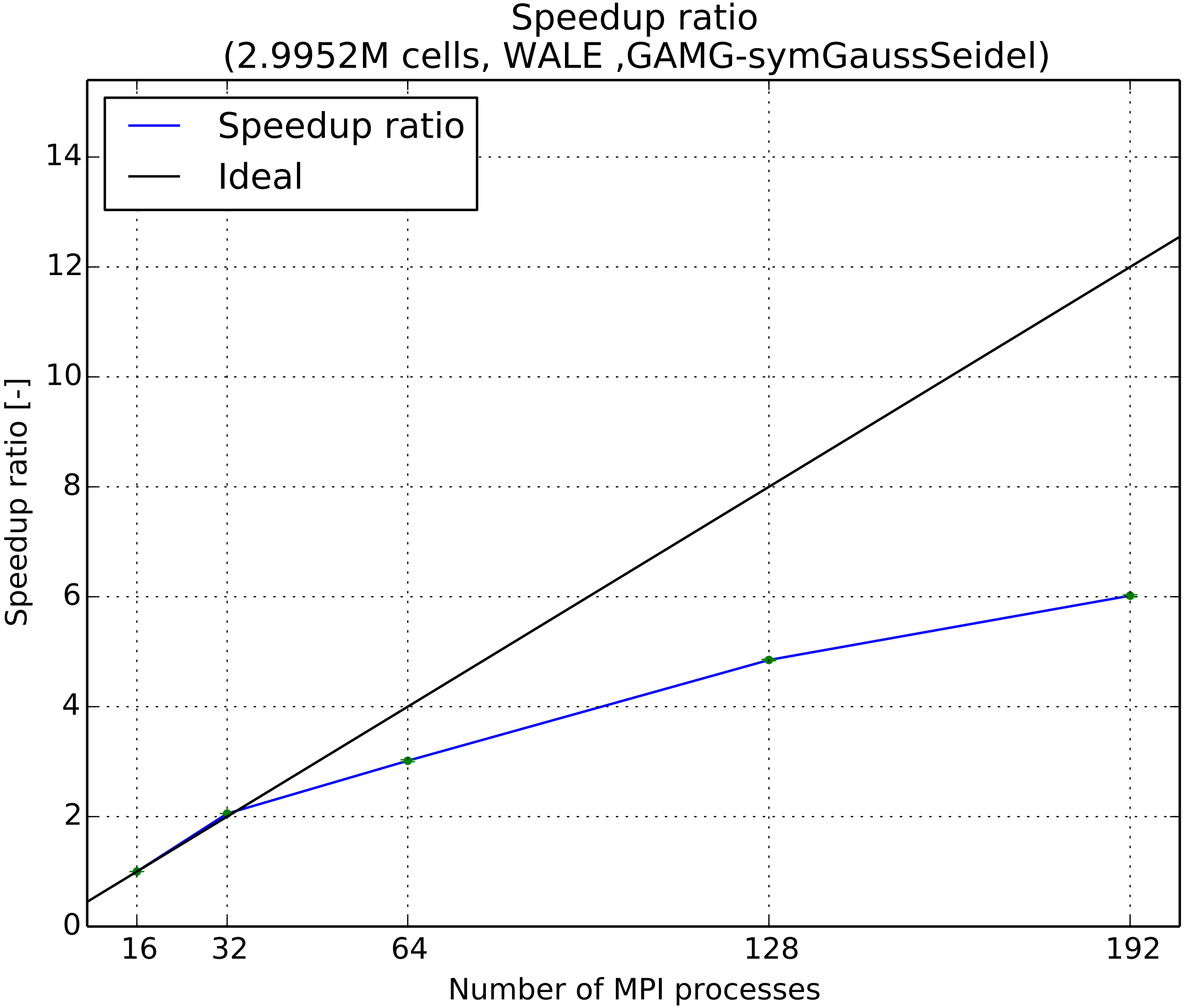
128
192
Number of MPI processes


Speedup ratio
(2.9952M cells, WALE ,GAMG-symGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
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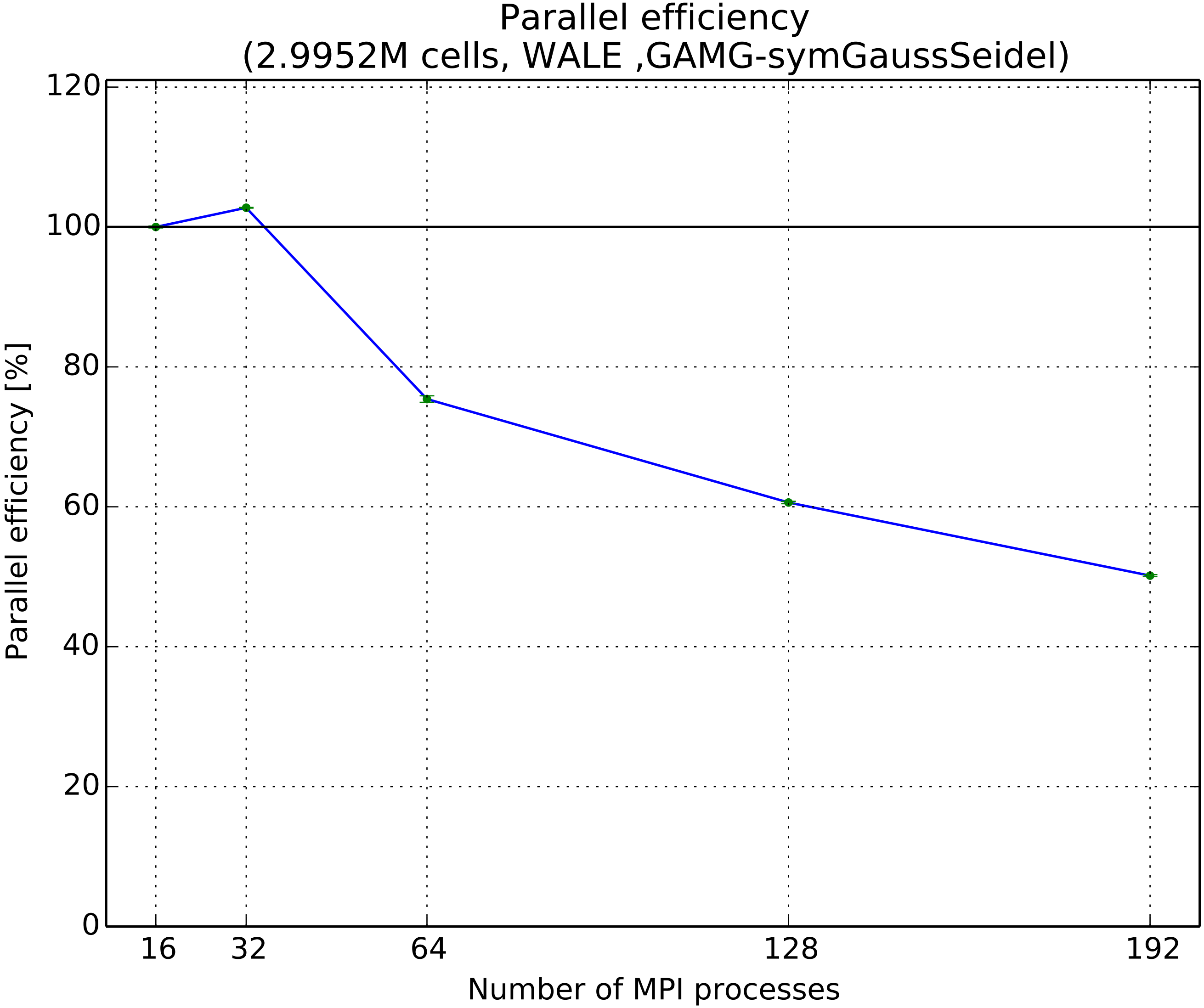
128
192
Number of MPI processes

Parallel efficiency
(2.9952M cells, WALE ,GAMG-symGaussSeidel)
Parallel efficiency [%]
0
20
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60
80
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120
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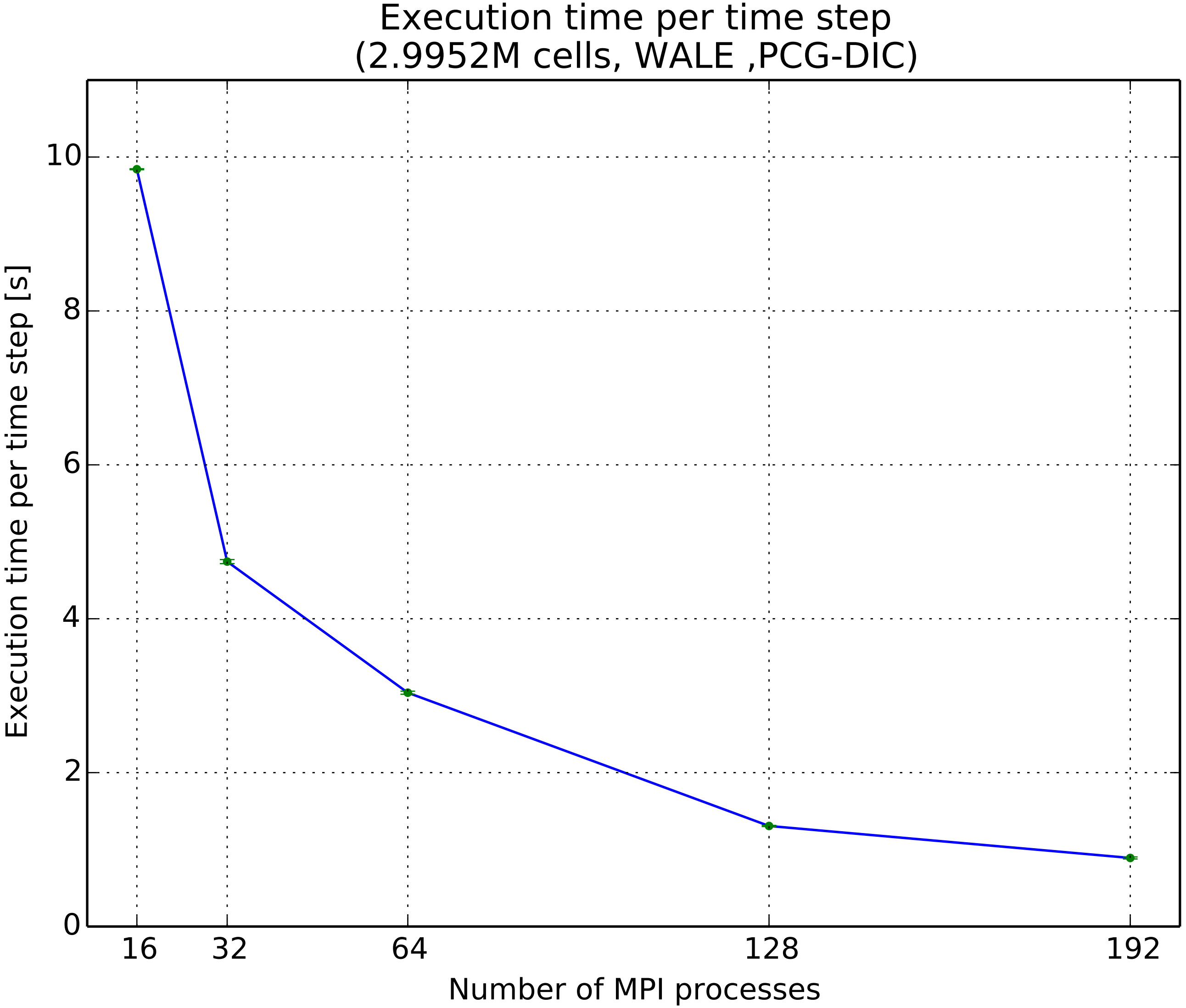
128
192
Number of MPI processes


Execution time per time step
(2.9952M cells, WALE ,PCG-DIC)
Execution time per time step [s]
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128
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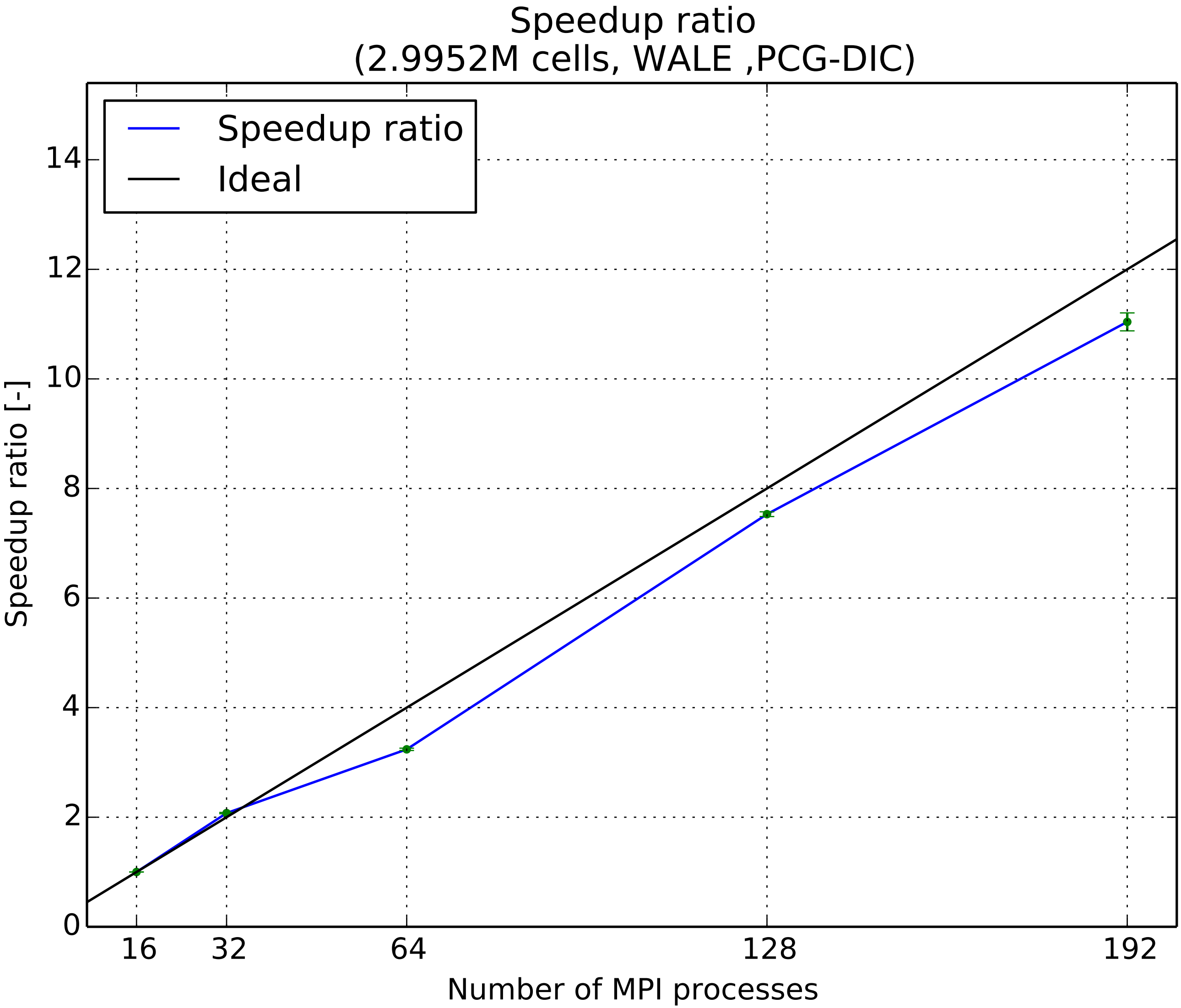
Number of MPI processes


Speedup ratio
(2.9952M cells, WALE ,PCG-DIC)
Speedup ratio
Ideal
Speedup ratio [-]
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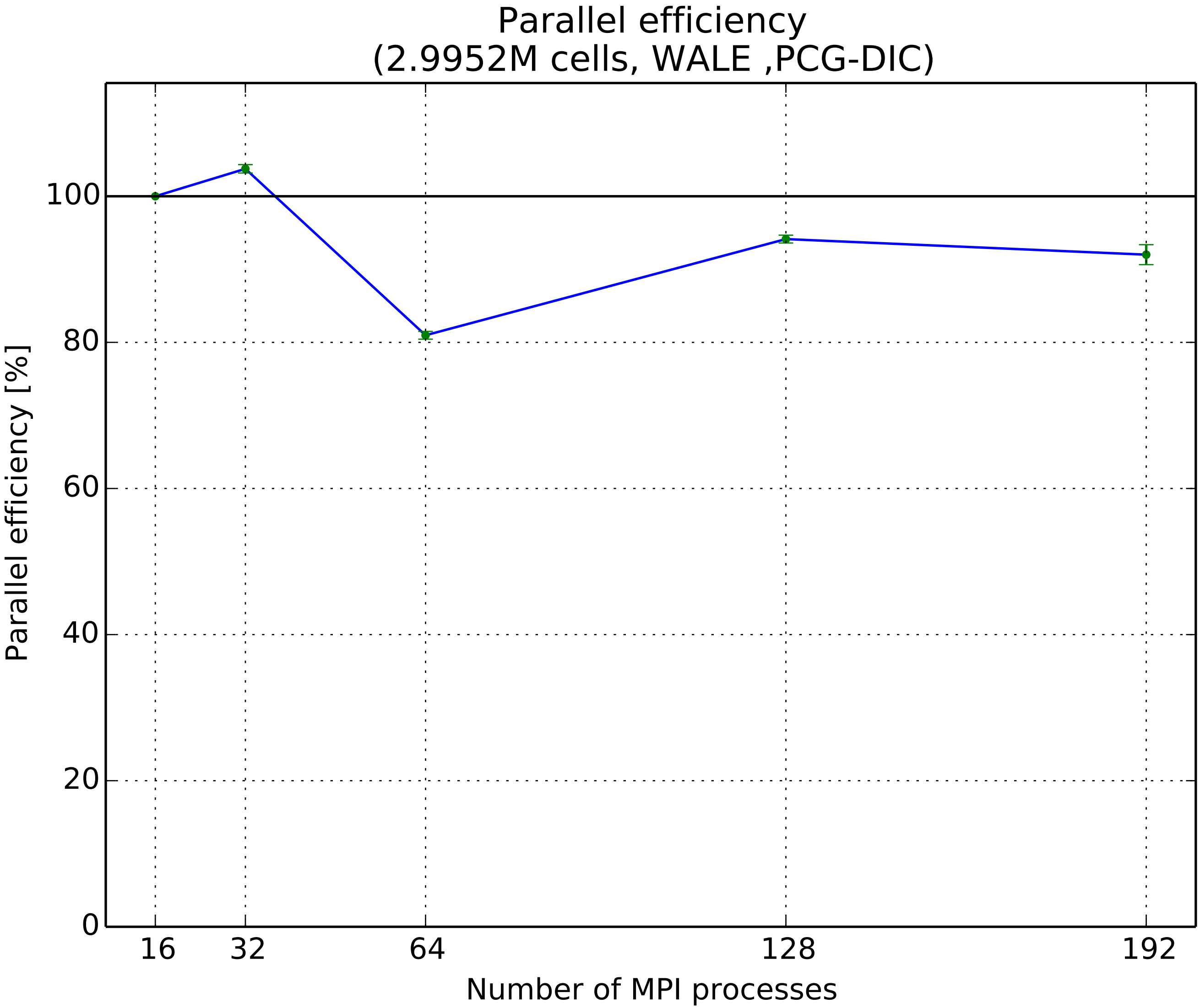
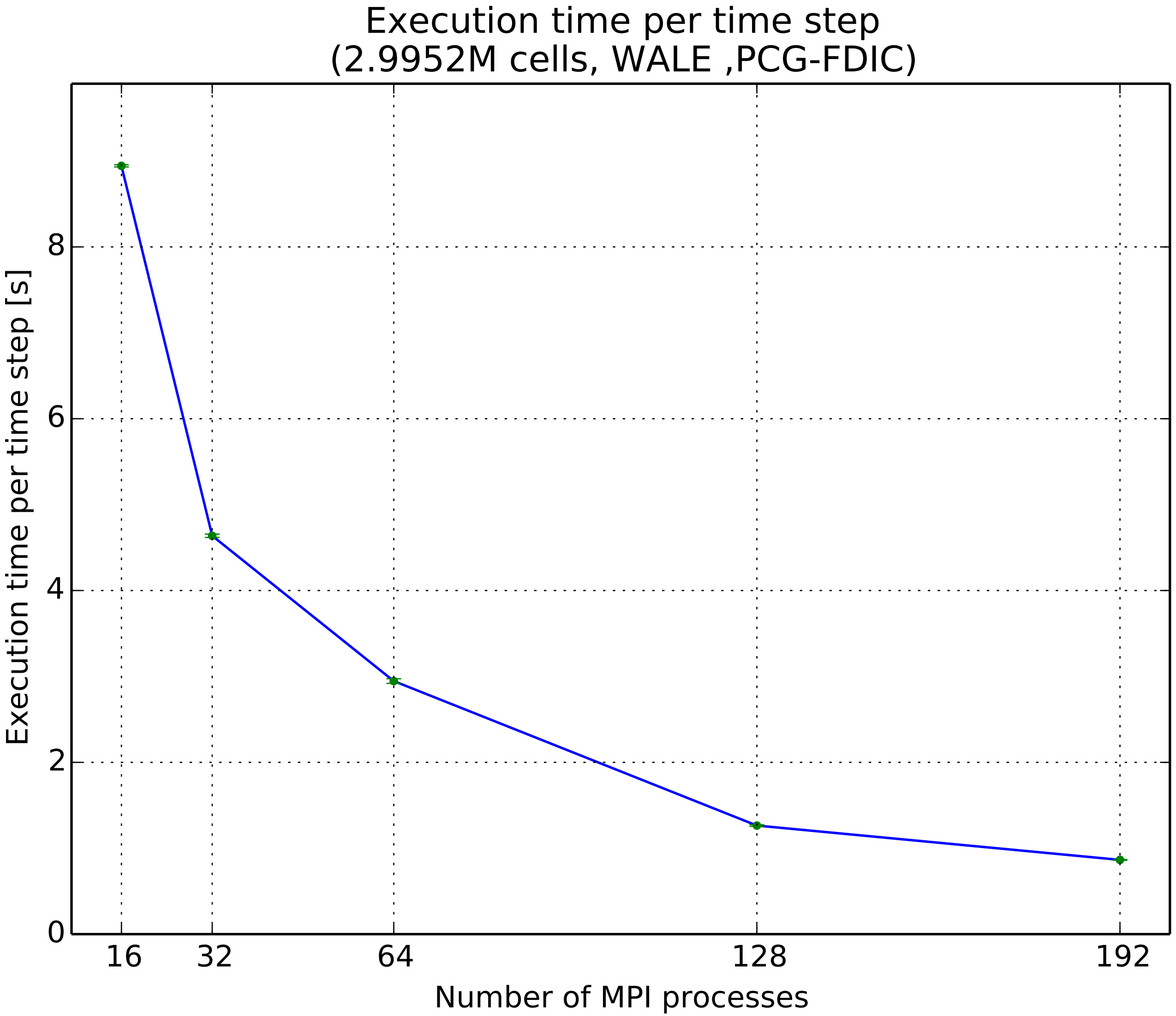
128
192
Number of MPI processes


Parallel efficiency
(2.9952M cells, WALE ,PCG-DIC)
Parallel efficiency [%]
0
20
40
60
80
100
16
32
64
128
192
Number of MPI processes


Execution time per time step
(2.9952M cells, WALE ,PCG-FDIC)
Execution time per time step [s]
0
2
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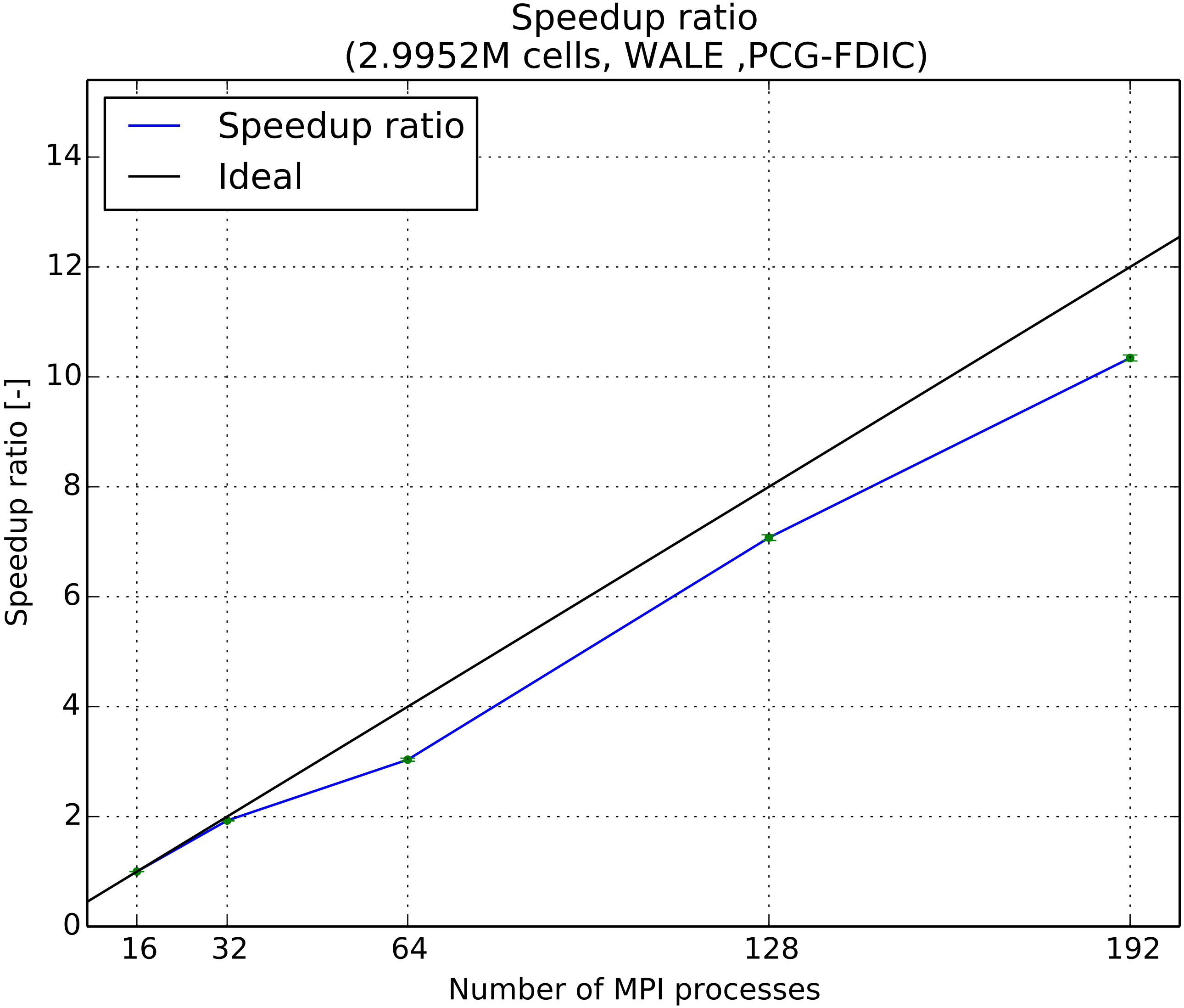
64
128
192
Number of MPI processes


Speedup ratio
(2.9952M cells, WALE ,PCG-FDIC)
Speedup ratio
Ideal
Speedup ratio [-]
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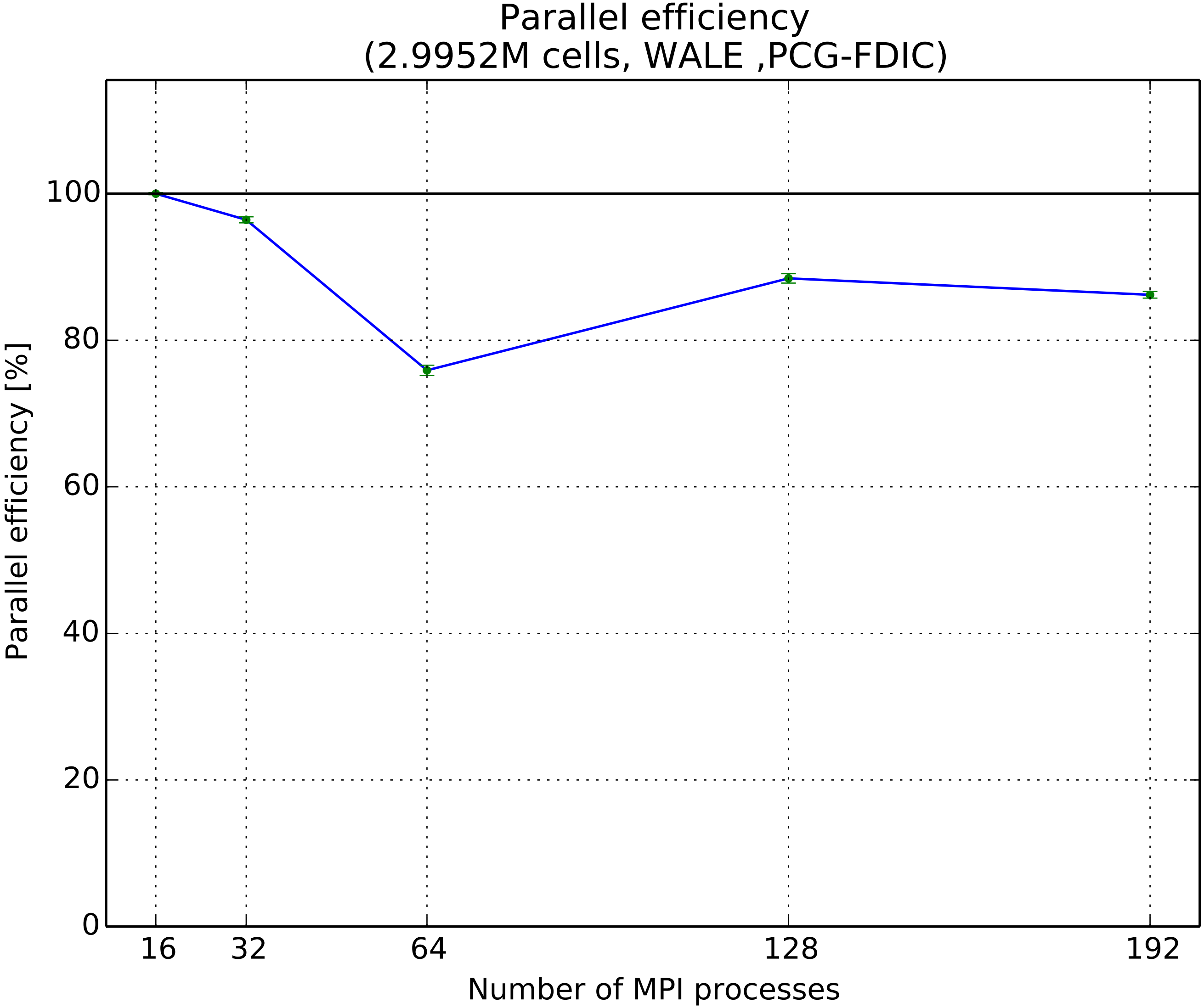
128
192
Number of MPI processes


Parallel efficiency
(2.9952M cells, WALE ,PCG-FDIC)
Parallel efficiency [%]
0
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60
80
100
16
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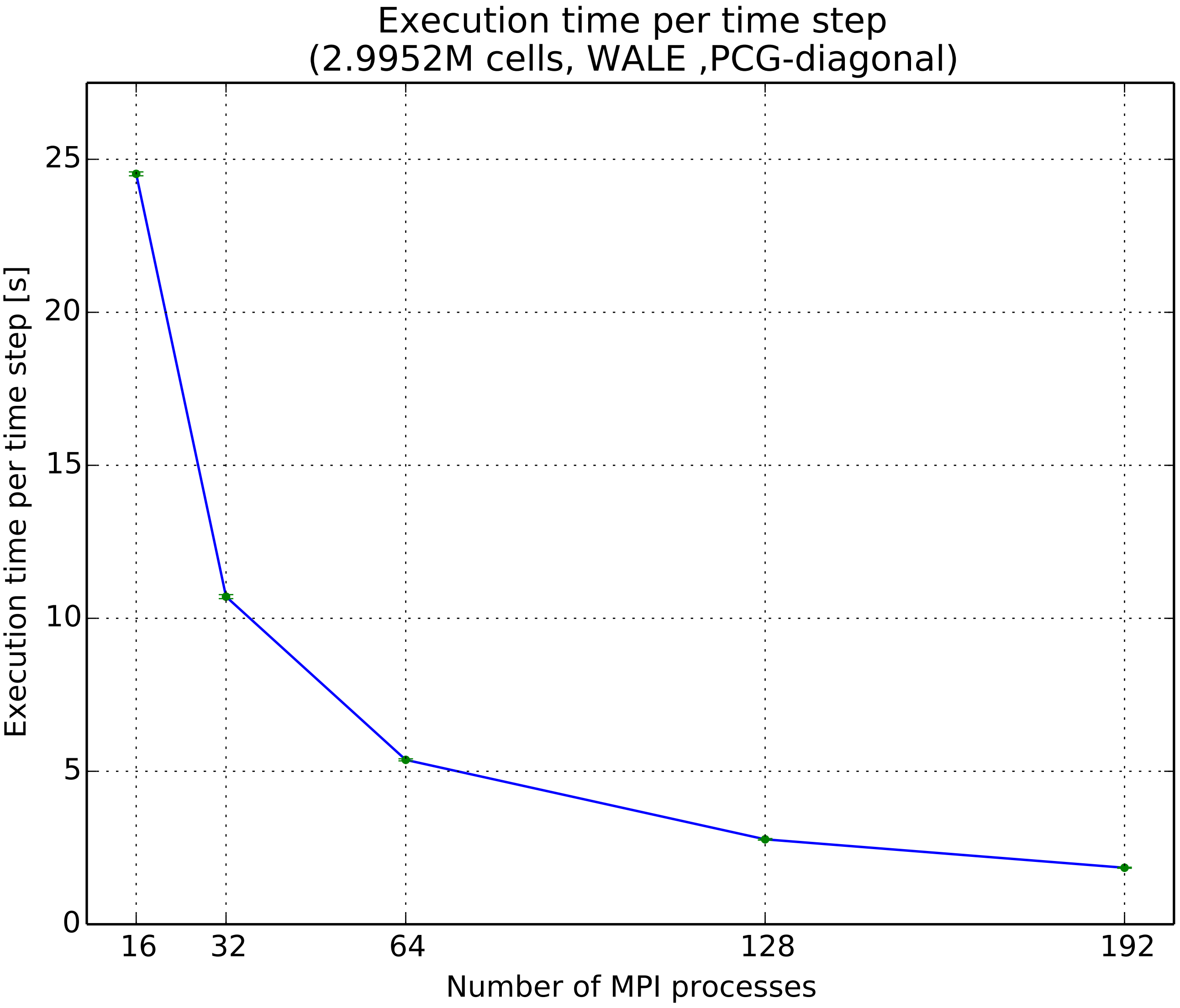
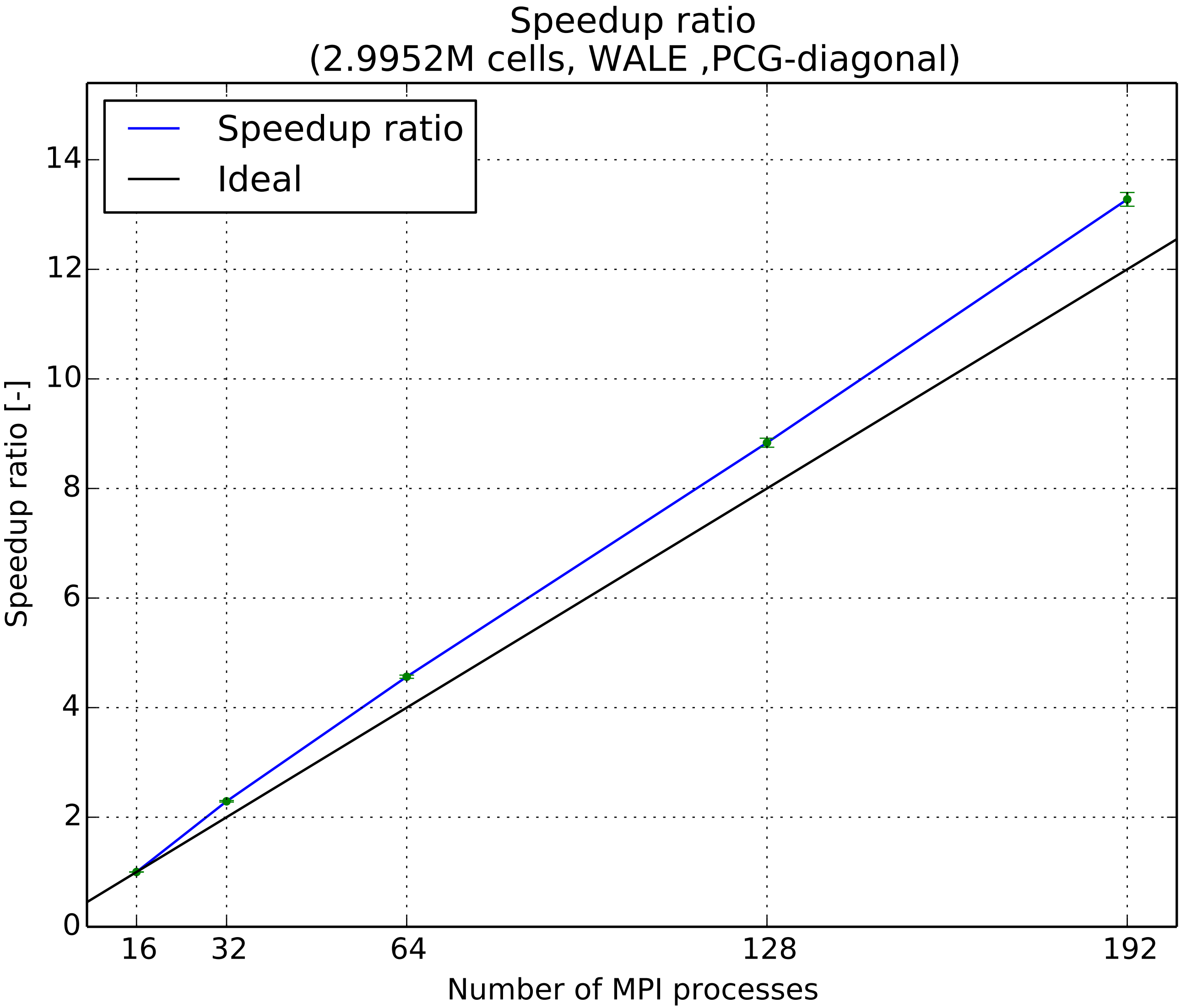
64
128
192
Number of MPI processes


Execution time per time step
(2.9952M cells, WALE ,PCG-diagonal)
Execution time per time step [s]
0
5
10
15
20
25
16
32
64
128
192
Number of MPI processes


Speedup ratio
(2.9952M cells, WALE ,PCG-diagonal)
Speedup ratio
Ideal
Speedup ratio [-]
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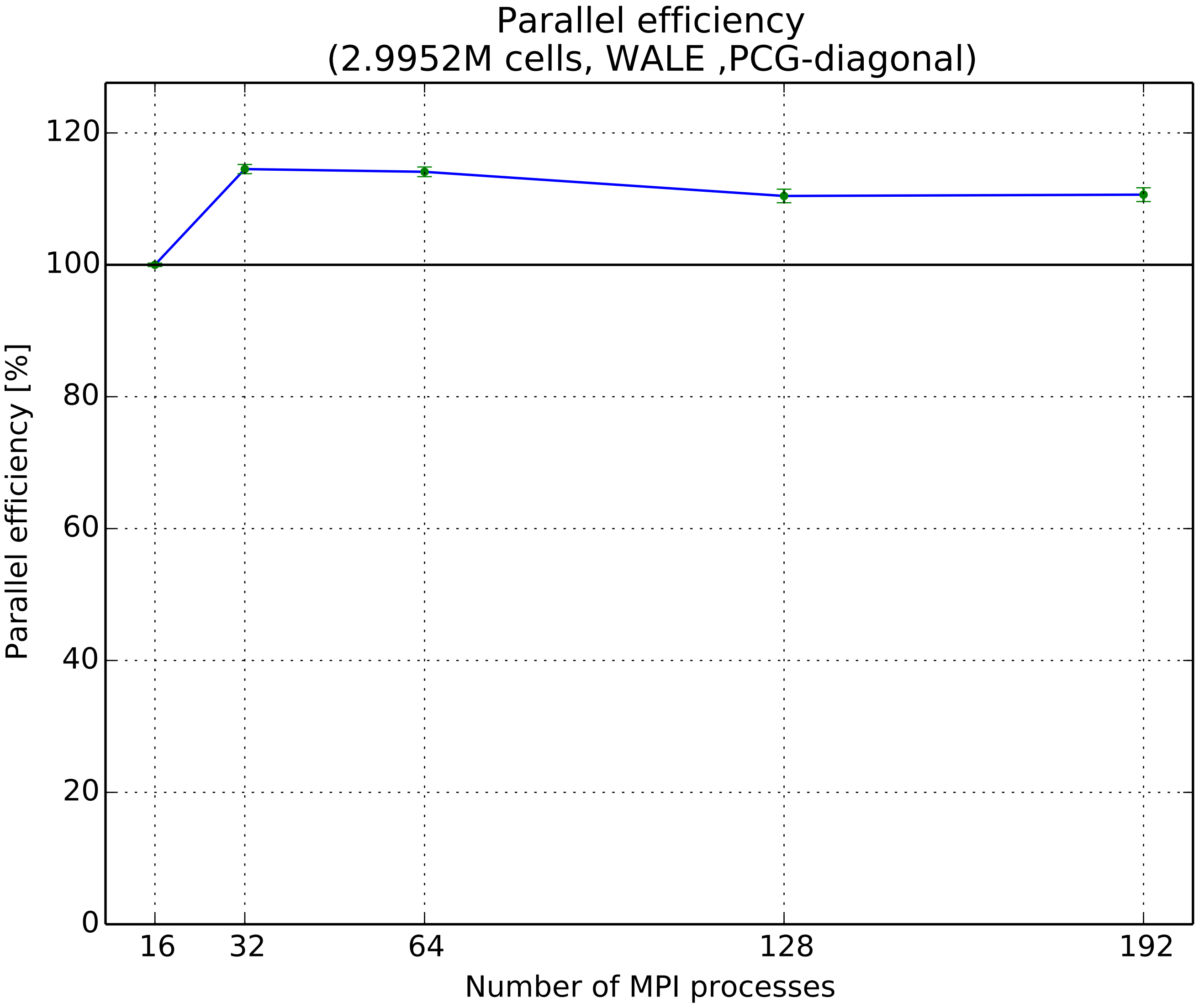
Number of MPI processes



Parallel efficiency
(2.9952M cells, WALE ,PCG-diagonal)
Parallel efficiency [%]
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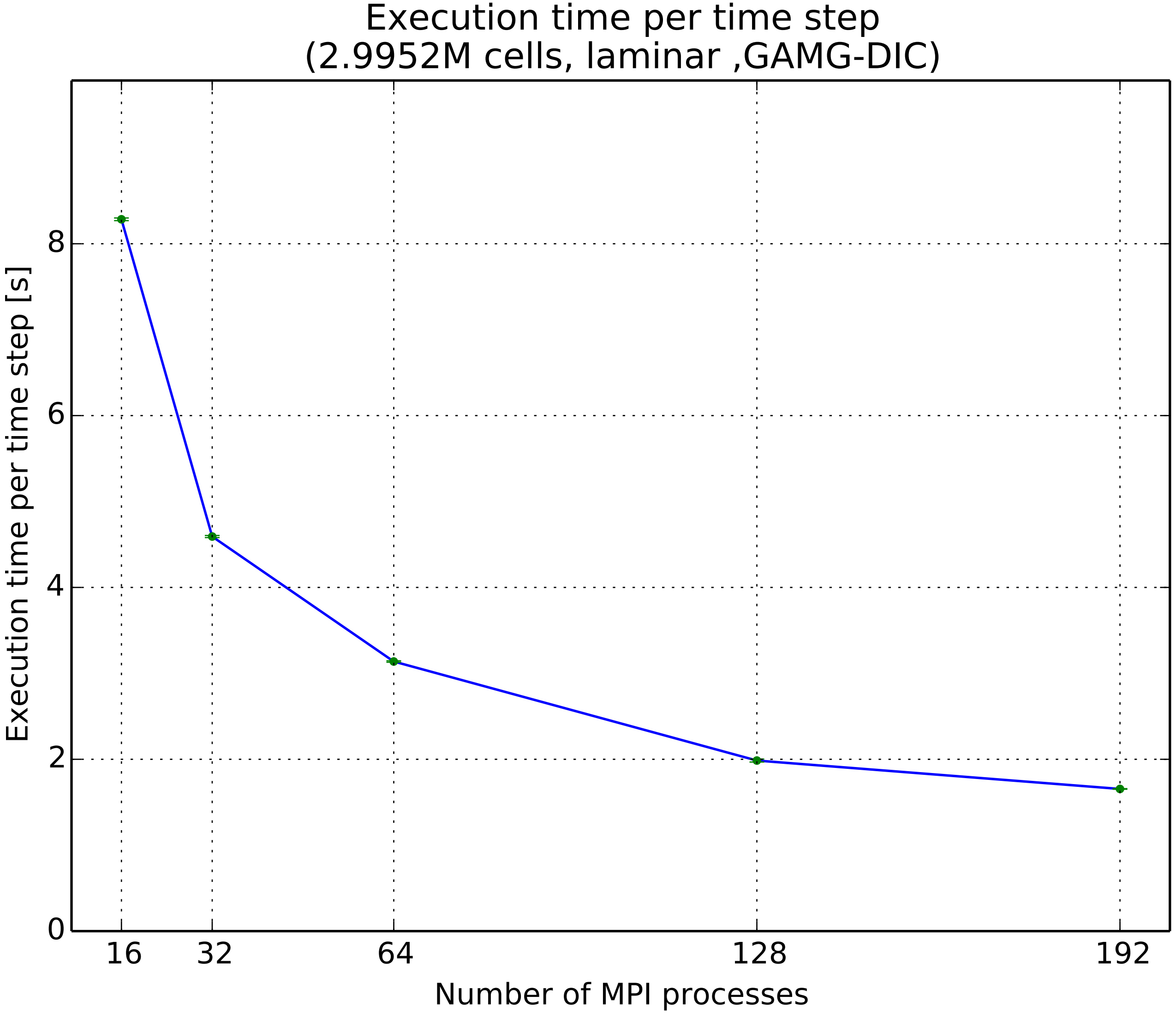
192
Number of MPI processes


Execution time per time step
(2.9952M cells, laminar ,GAMG-DIC)
Execution time per time step [s]
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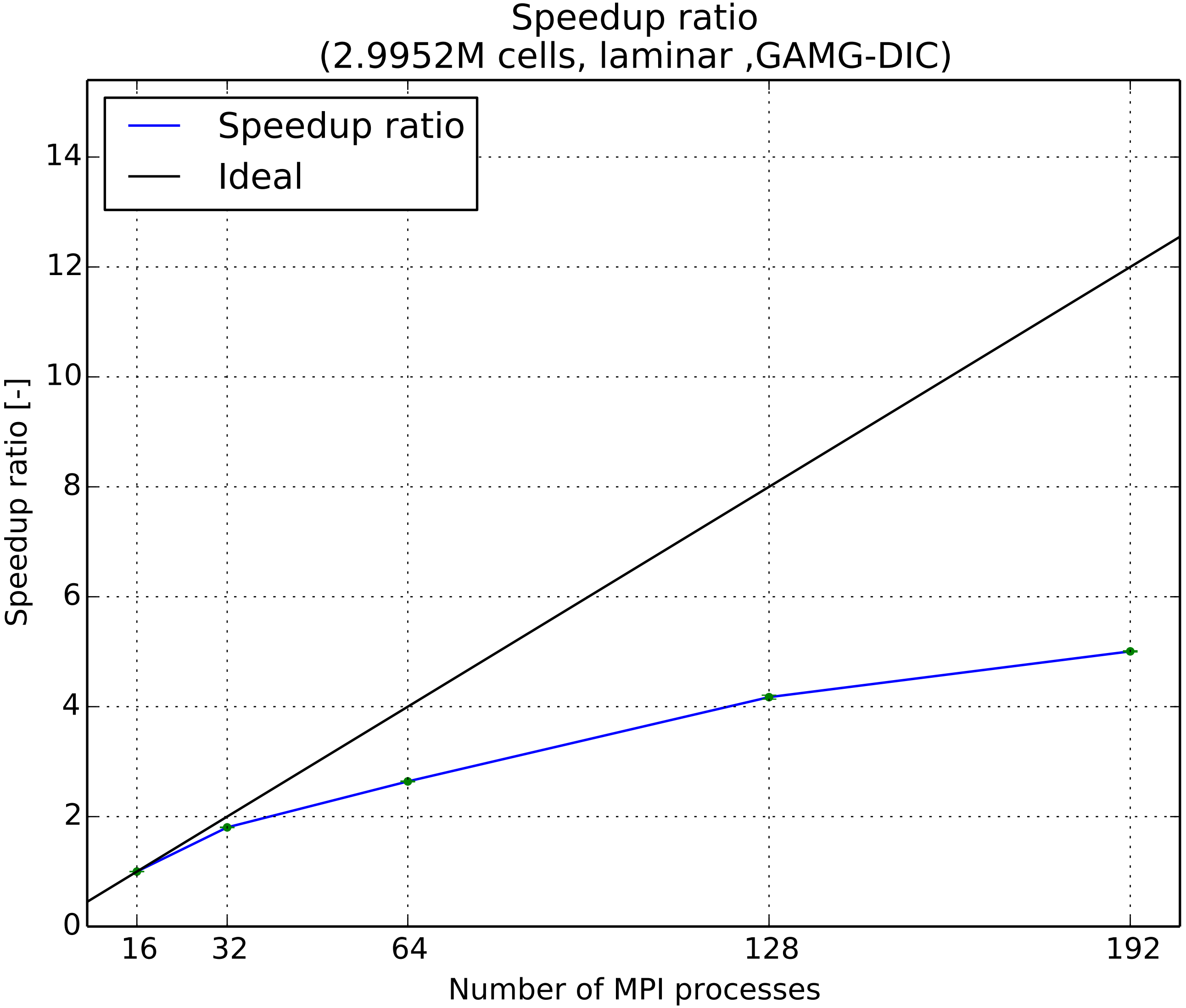
128
192
Number of MPI processes


Speedup ratio
(2.9952M cells, laminar ,GAMG-DIC)
Speedup ratio
Ideal
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Speedup ratio [-]
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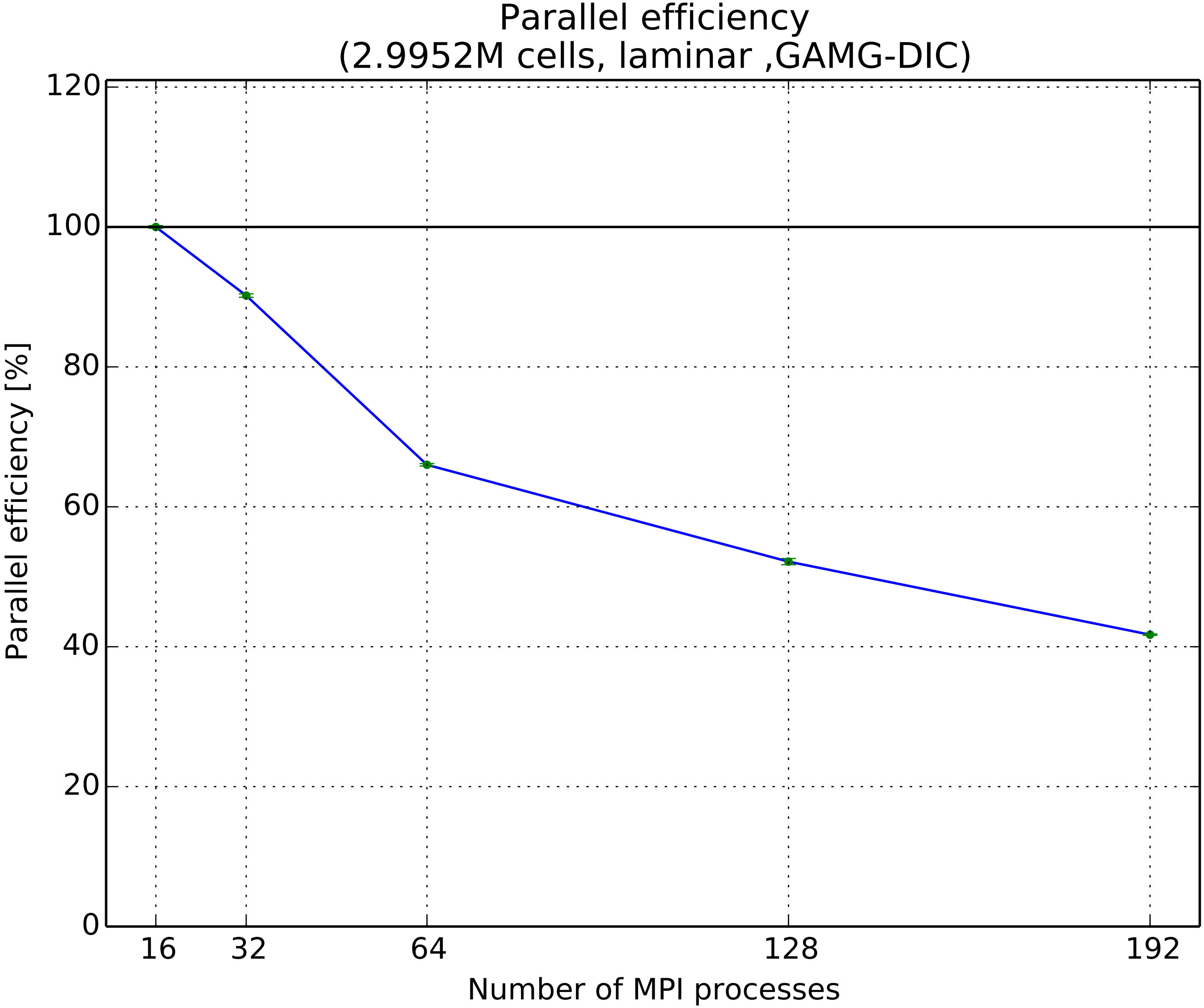
Number of MPI processes


Parallel efficiency
(2.9952M cells, laminar ,GAMG-DIC)
Parallel efficiency [%]
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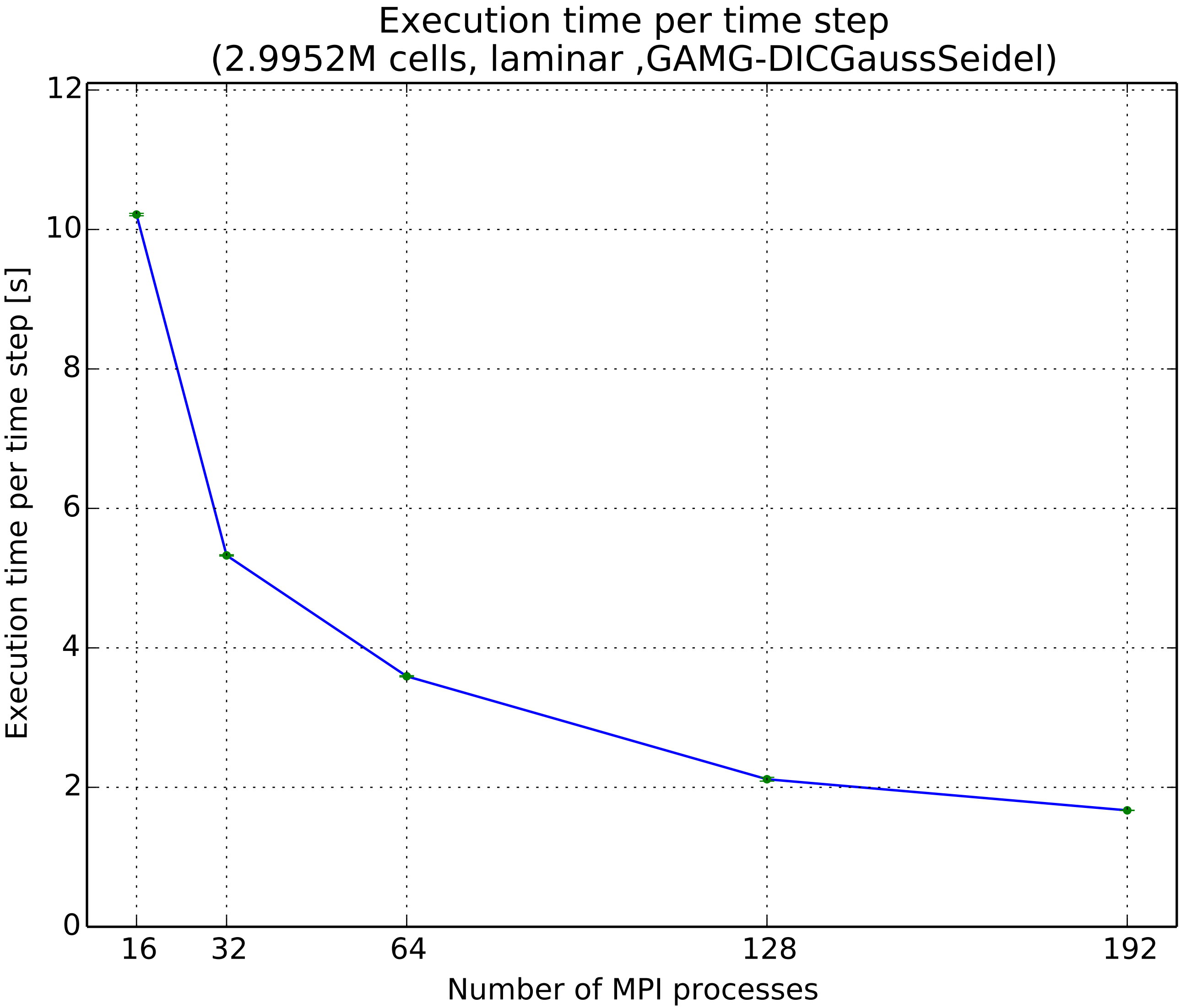
Number of MPI processes


Execution time per time step
(2.9952M cells, laminar ,GAMG-DICGaussSeidel)
Execution time per time step [s]
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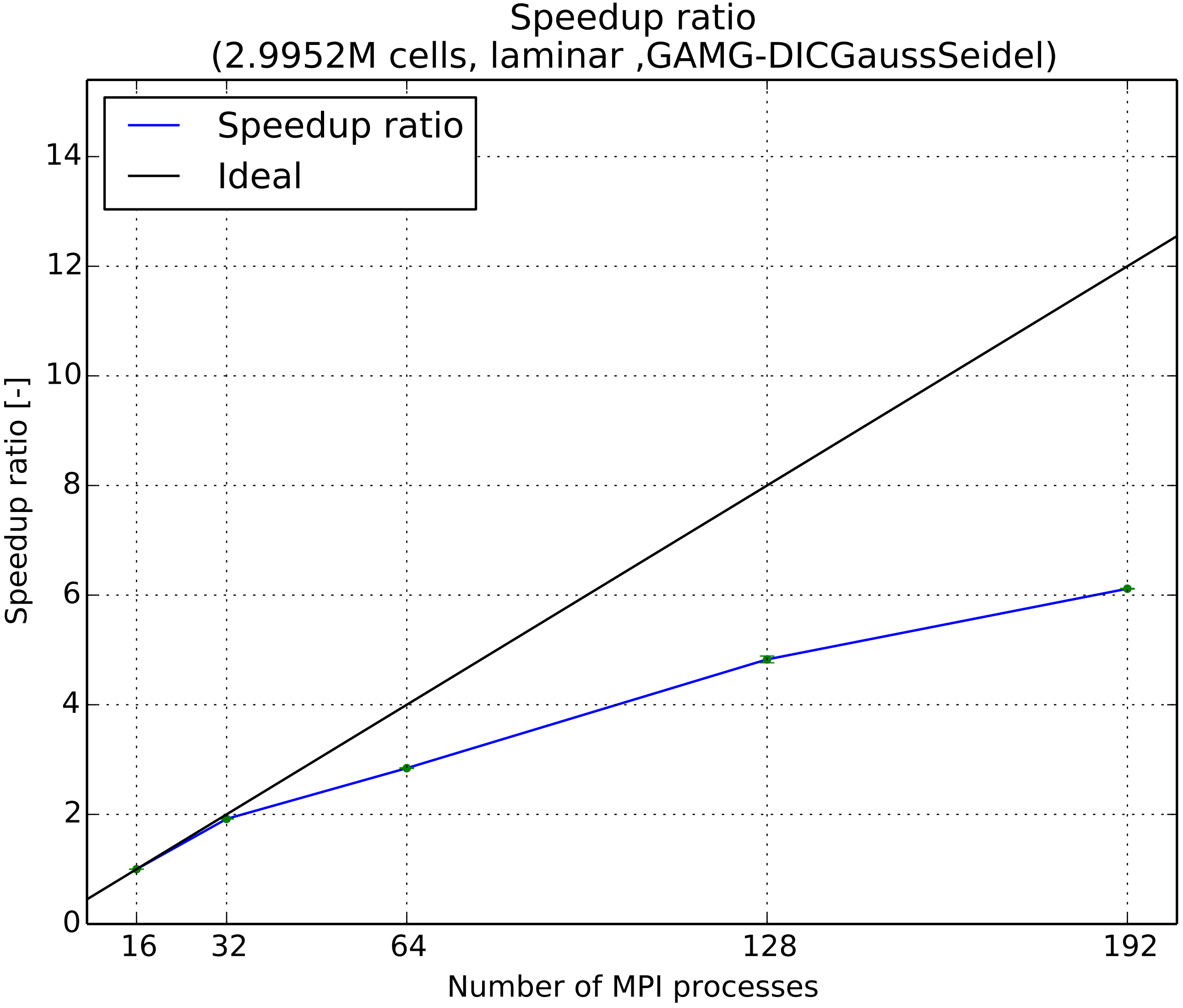
Number of MPI processes


Speedup ratio
(2.9952M cells, laminar ,GAMG-DICGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
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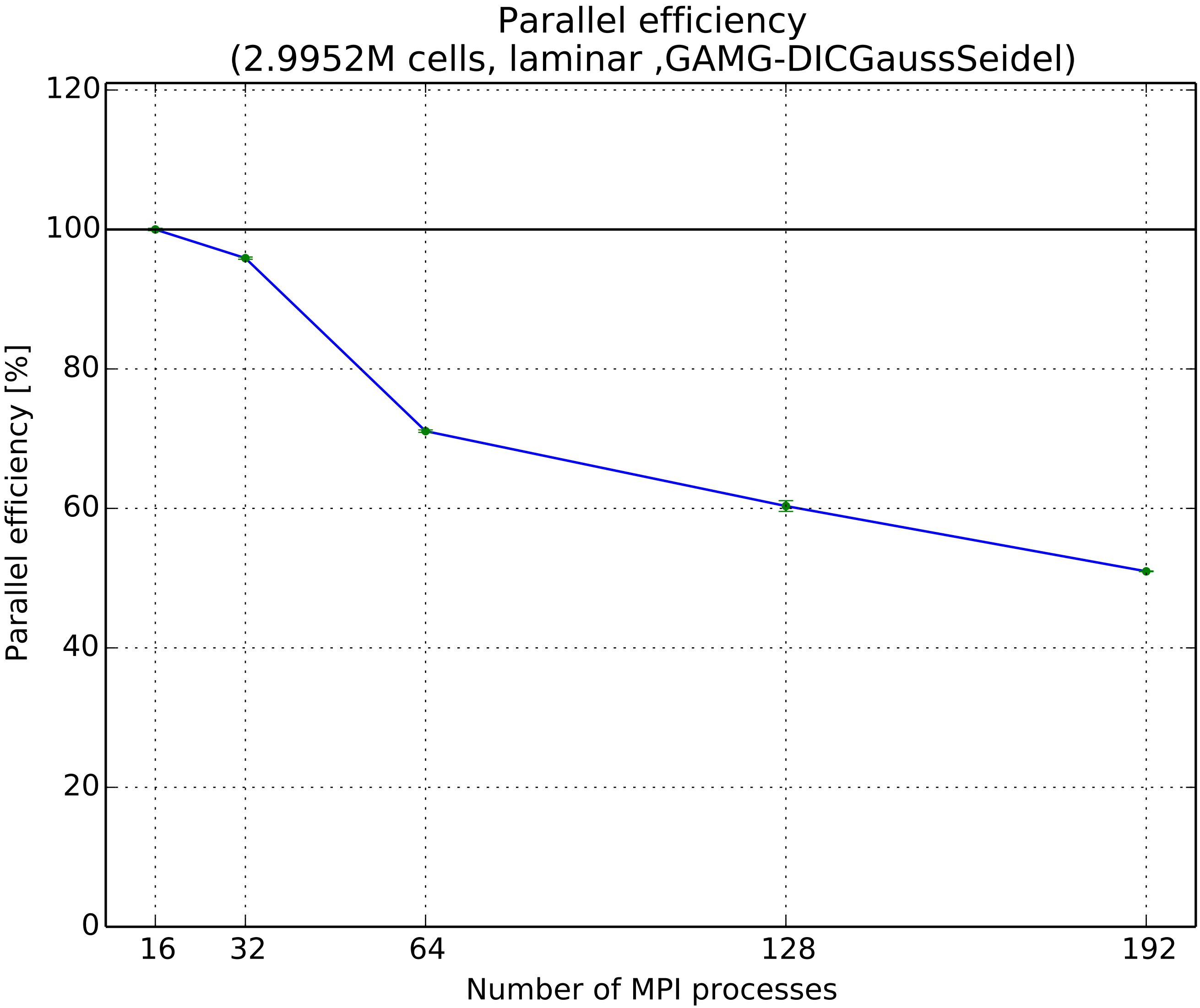
Number of MPI processes


Parallel efficiency
(2.9952M cells, laminar ,GAMG-DICGaussSeidel)
Parallel efficiency [%]
120
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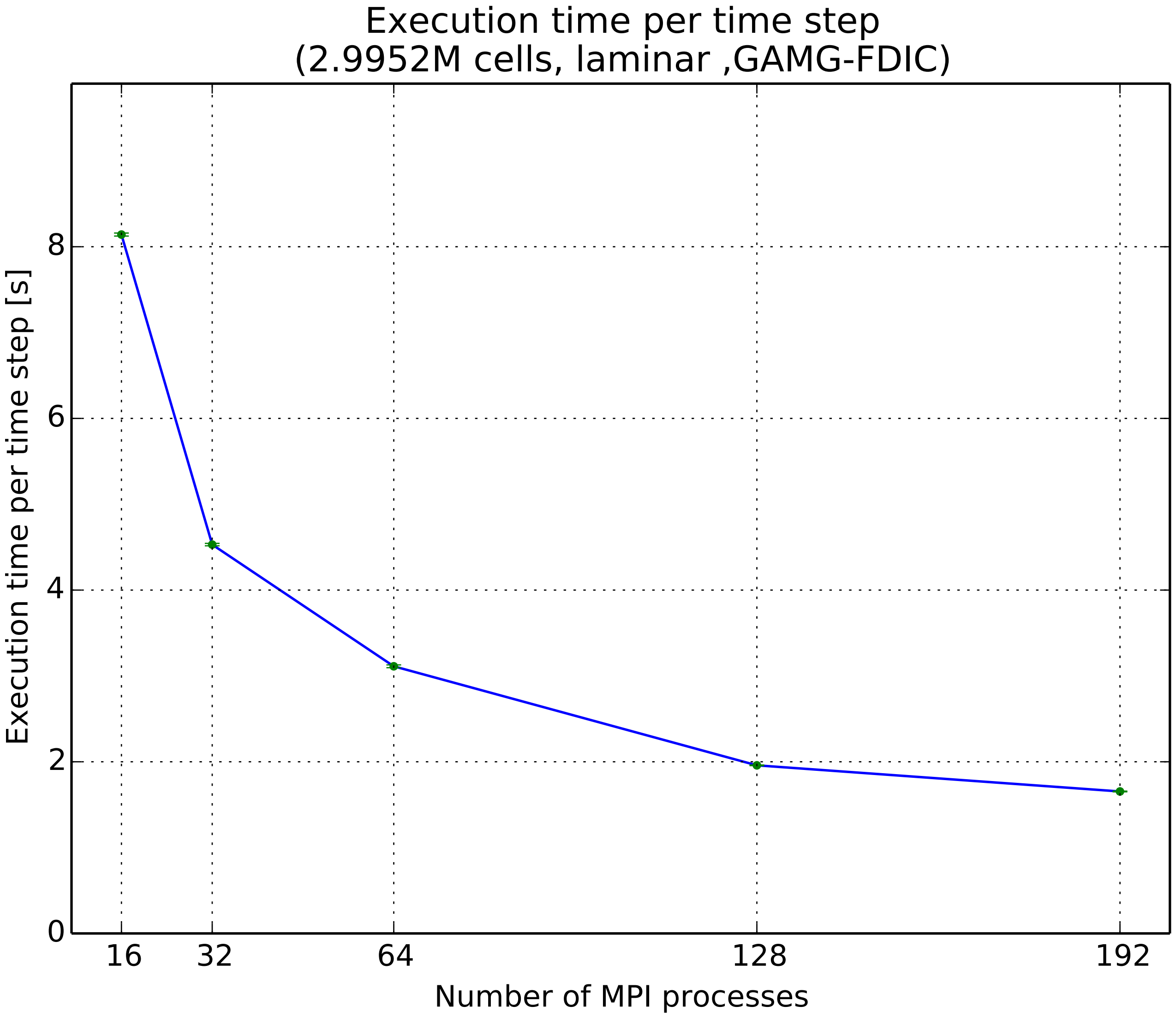
Number of MPI processes


Execution time per time step
(2.9952M cells, laminar ,GAMG-FDIC)
Execution time per time step [s]
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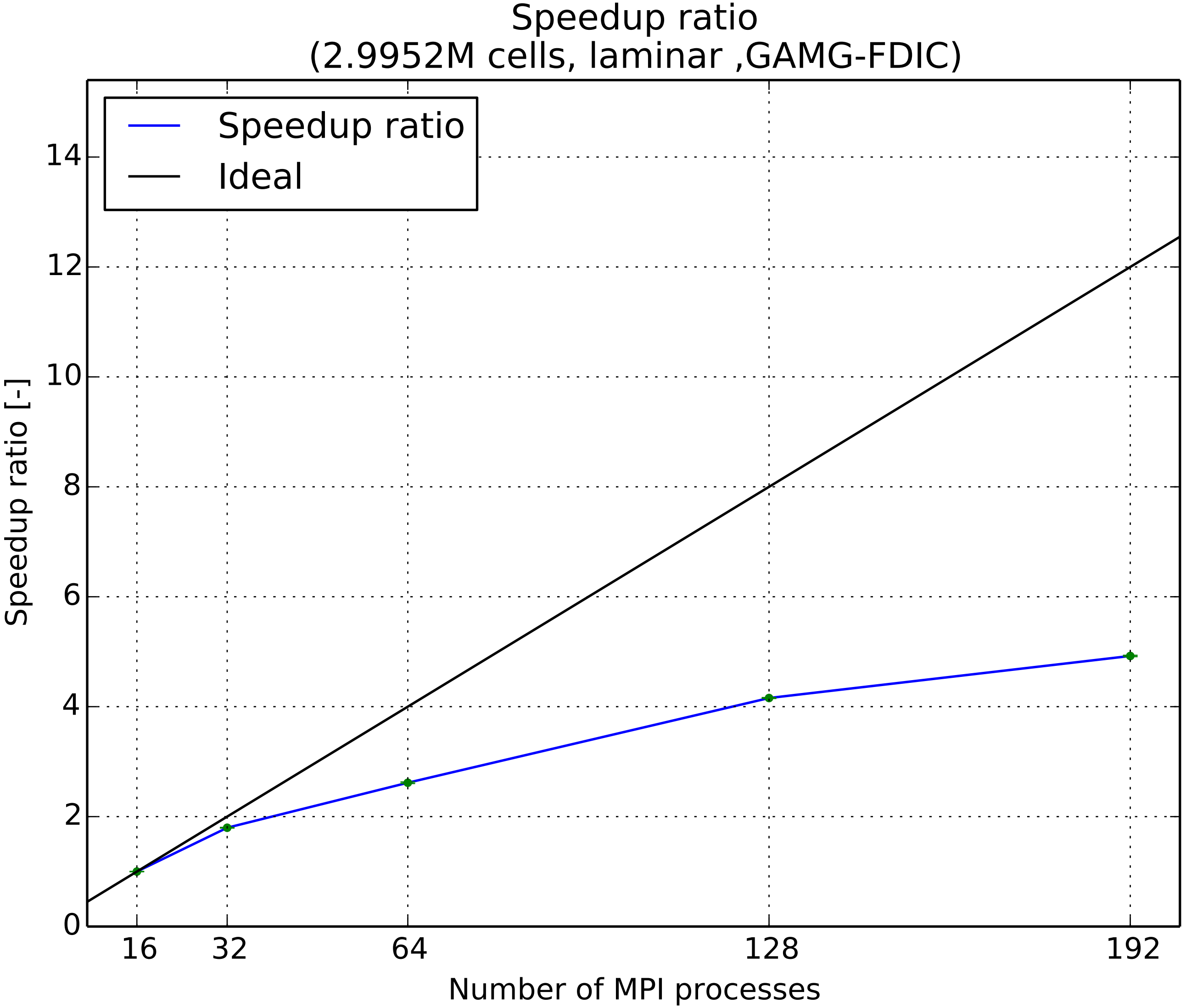
Number of MPI processes


Speedup ratio
(2.9952M cells, laminar ,GAMG-FDIC)
Speedup ratio
Ideal
Speedup ratio [-]
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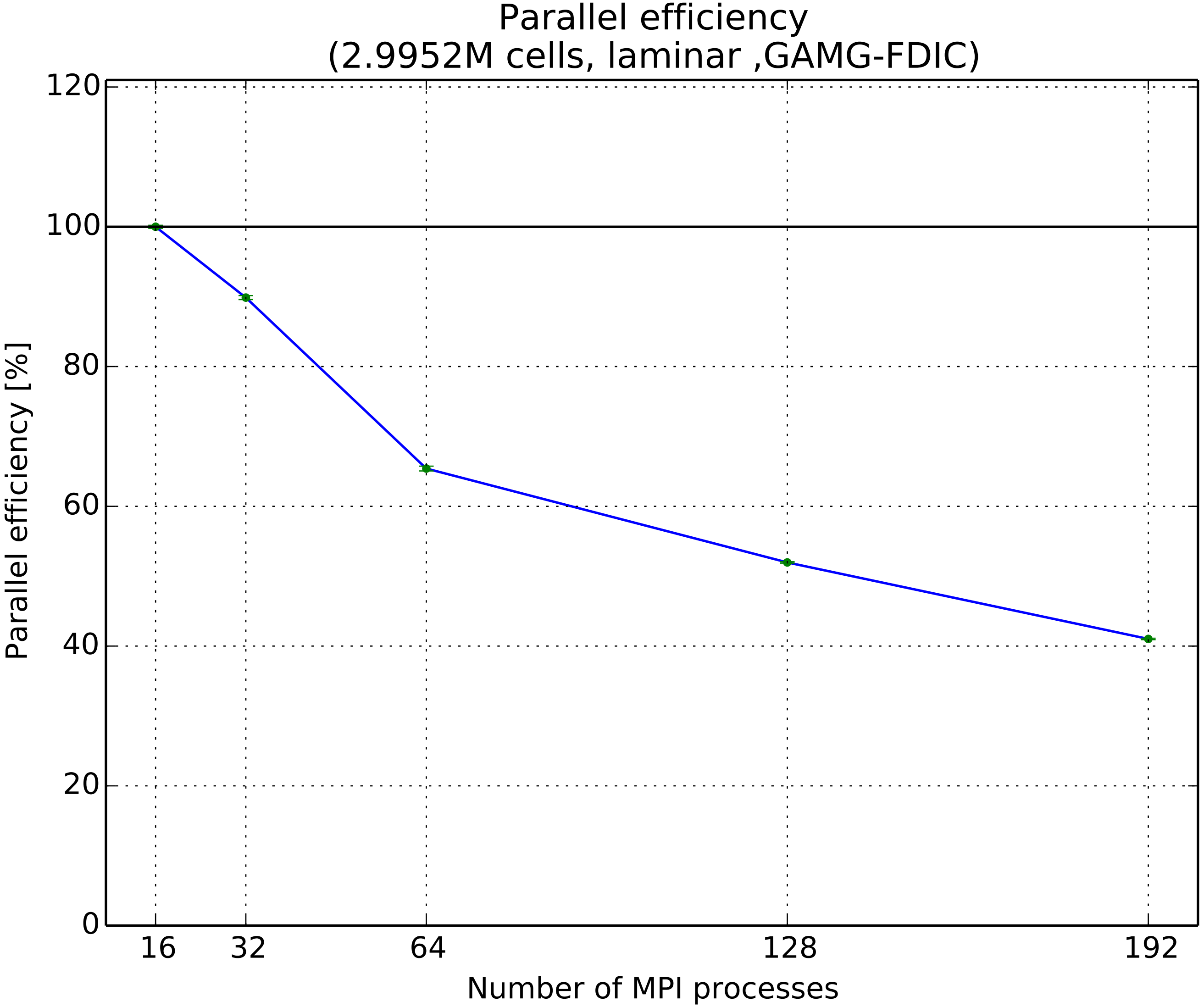
Number of MPI processes


Parallel efficiency
(2.9952M cells, laminar ,GAMG-FDIC)
Parallel efficiency [%]
Number of MPI processes
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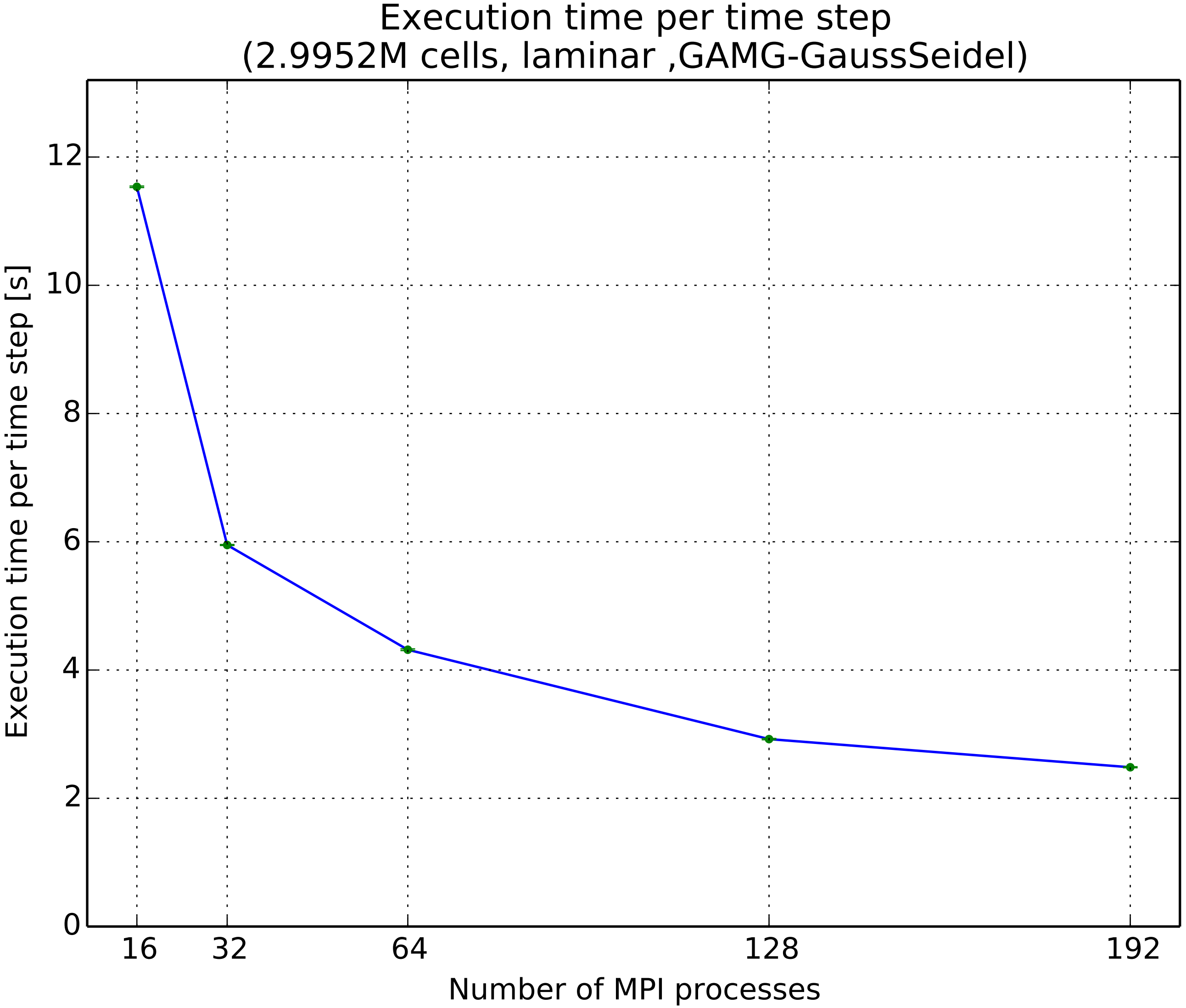
Execution time per time step
(2.9952M cells, laminar ,GAMG-GaussSeidel)
Execution time per time step [s]
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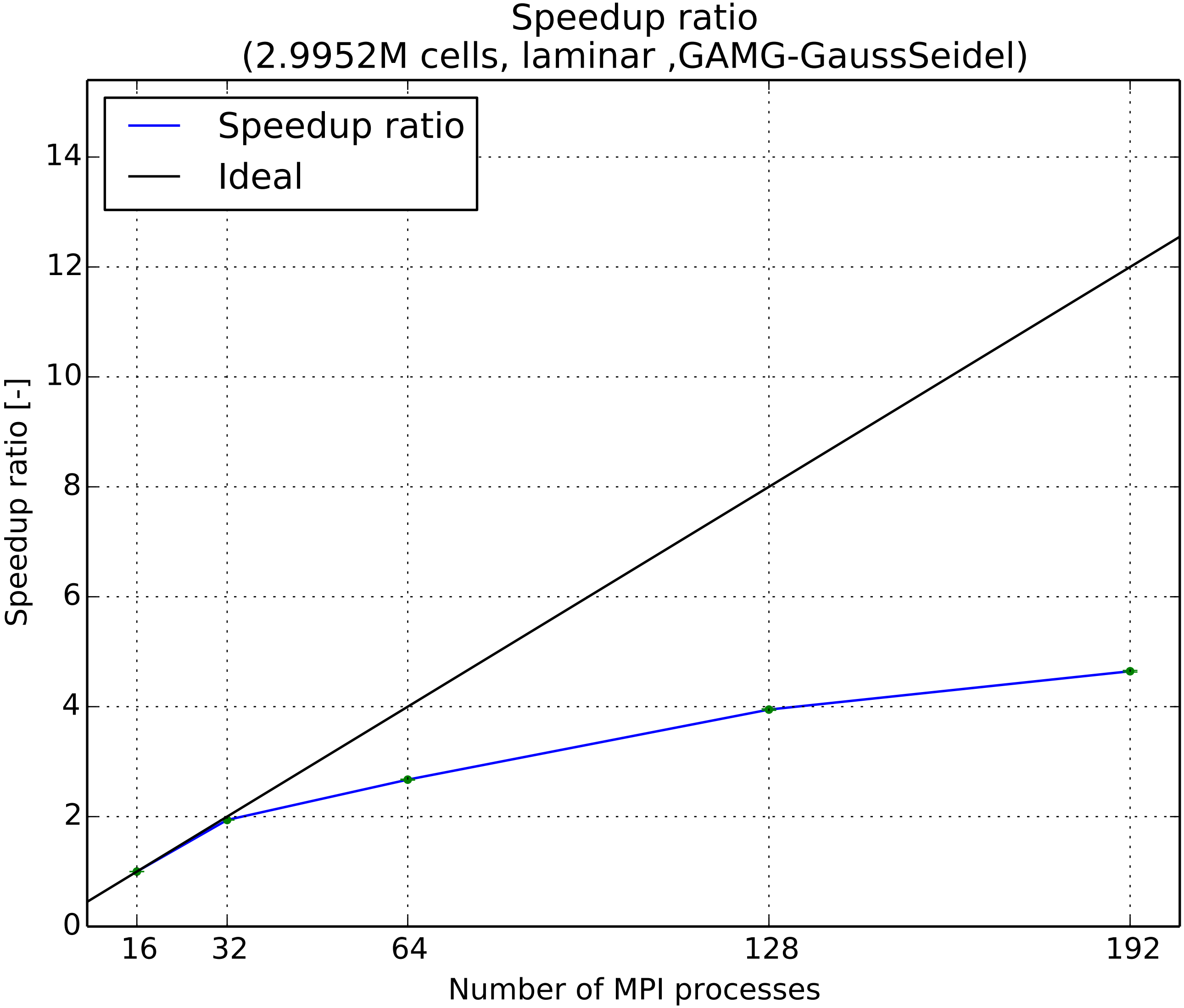
Number of MPI processes


Speedup ratio
(2.9952M cells, laminar ,GAMG-GaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
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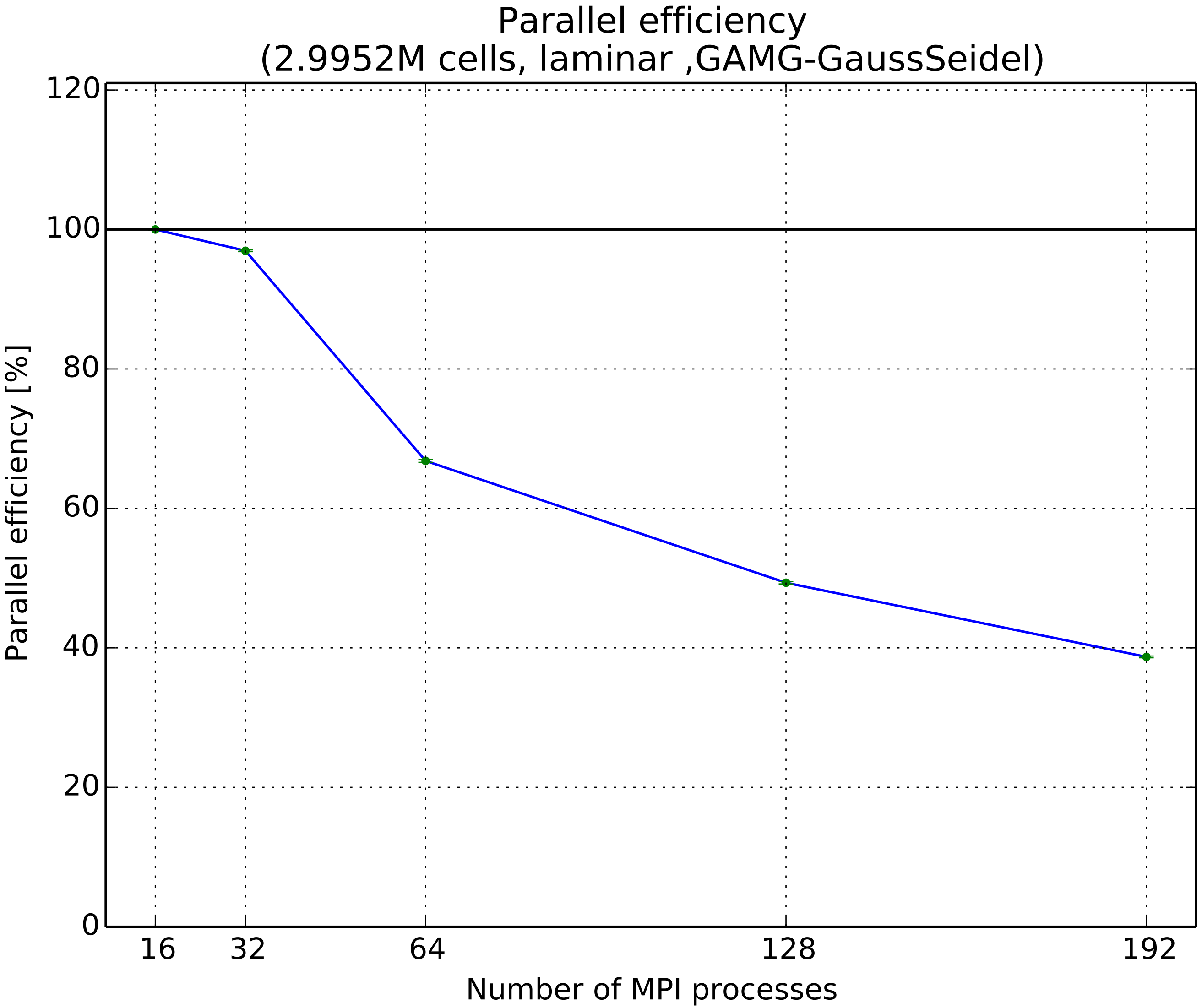
Number of MPI processes


Parallel efficiency
(2.9952M cells, laminar ,GAMG-GaussSeidel)
Parallel efficiency [%]
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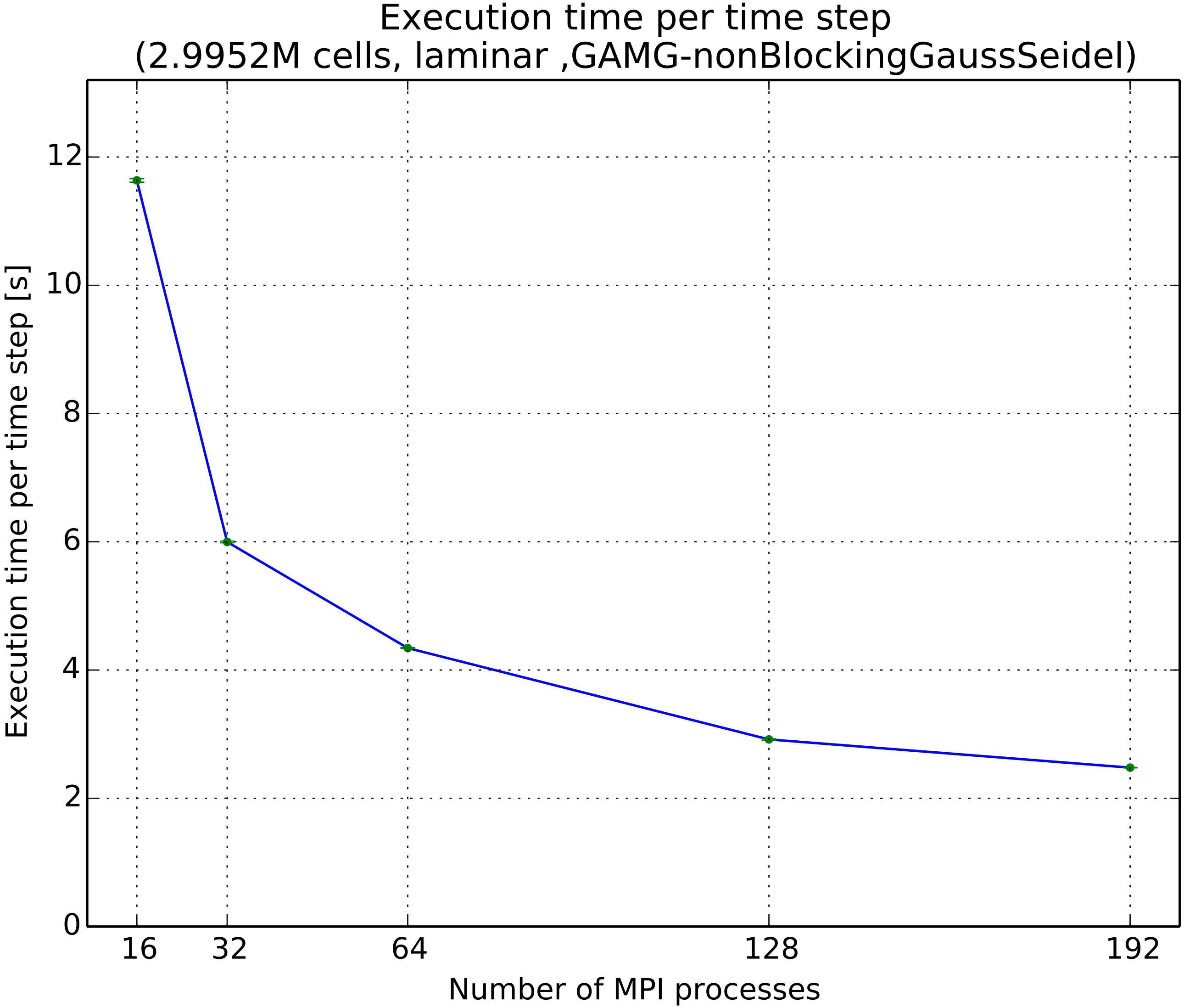
Number of MPI processes


Execution time per time step
(2.9952M cells, laminar ,GAMG-nonBlockingGaussSeidel)
Execution time per time step [s]
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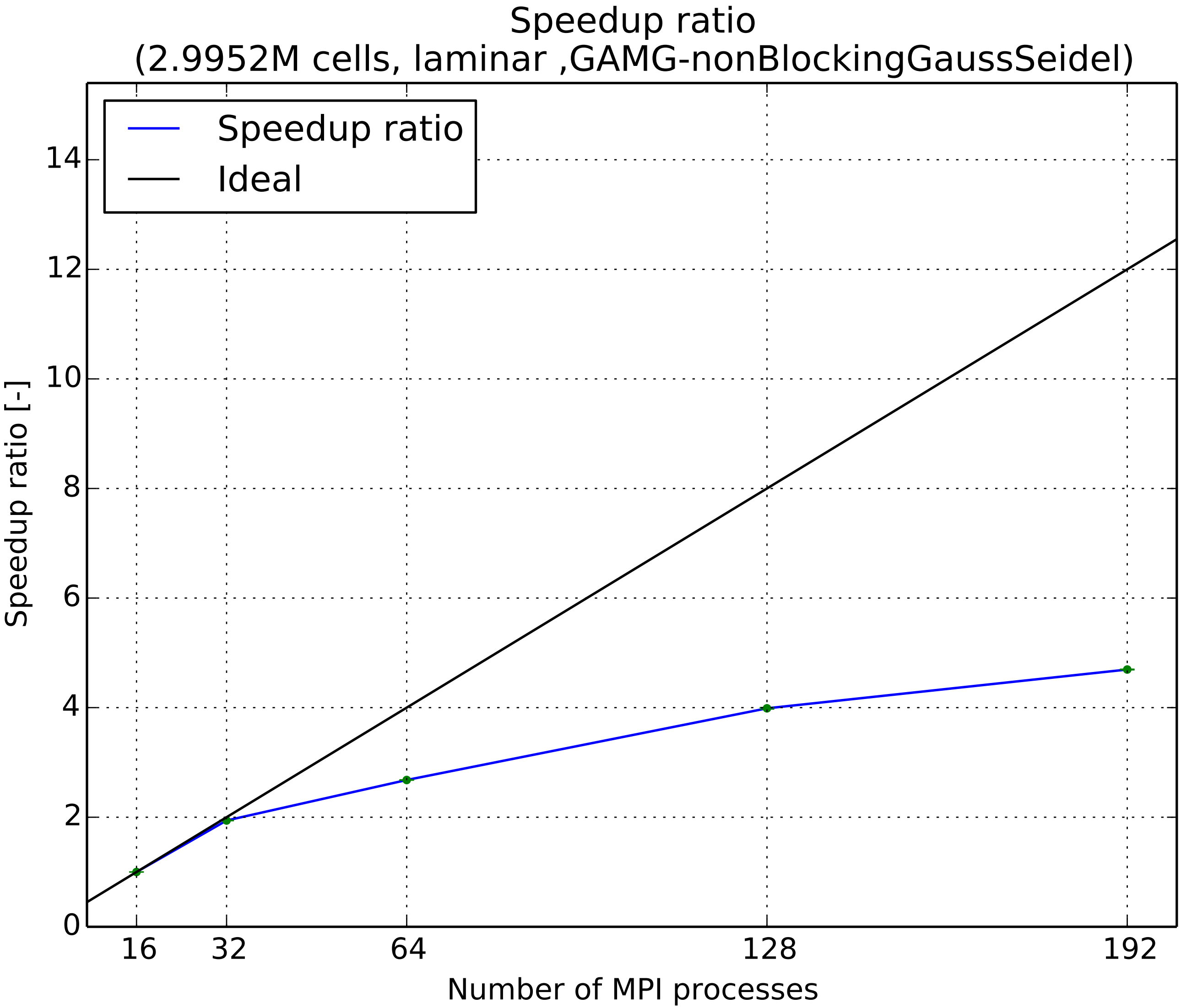
Number of MPI processes


Speedup ratio
(2.9952M cells, laminar ,GAMG-nonBlockingGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
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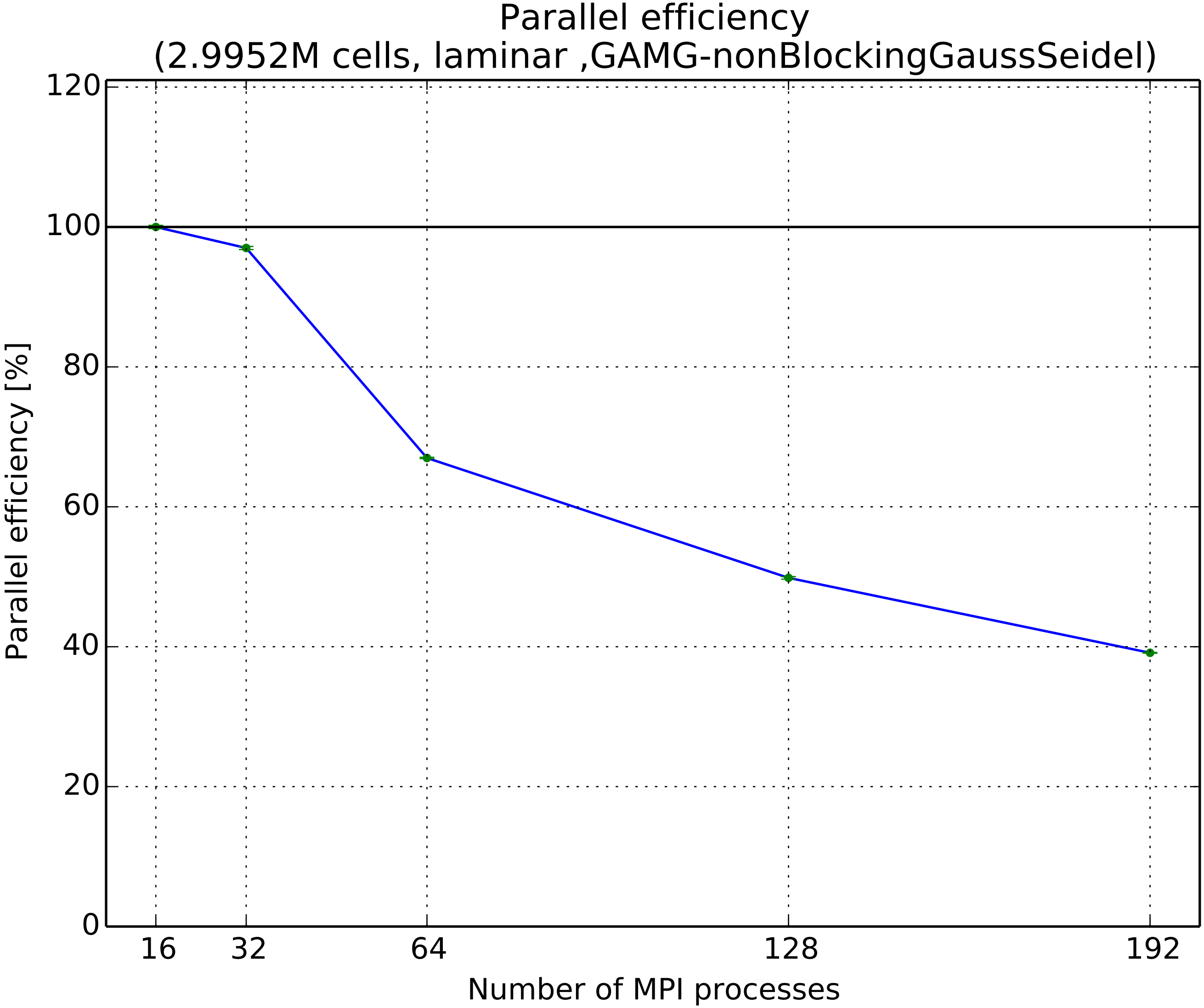
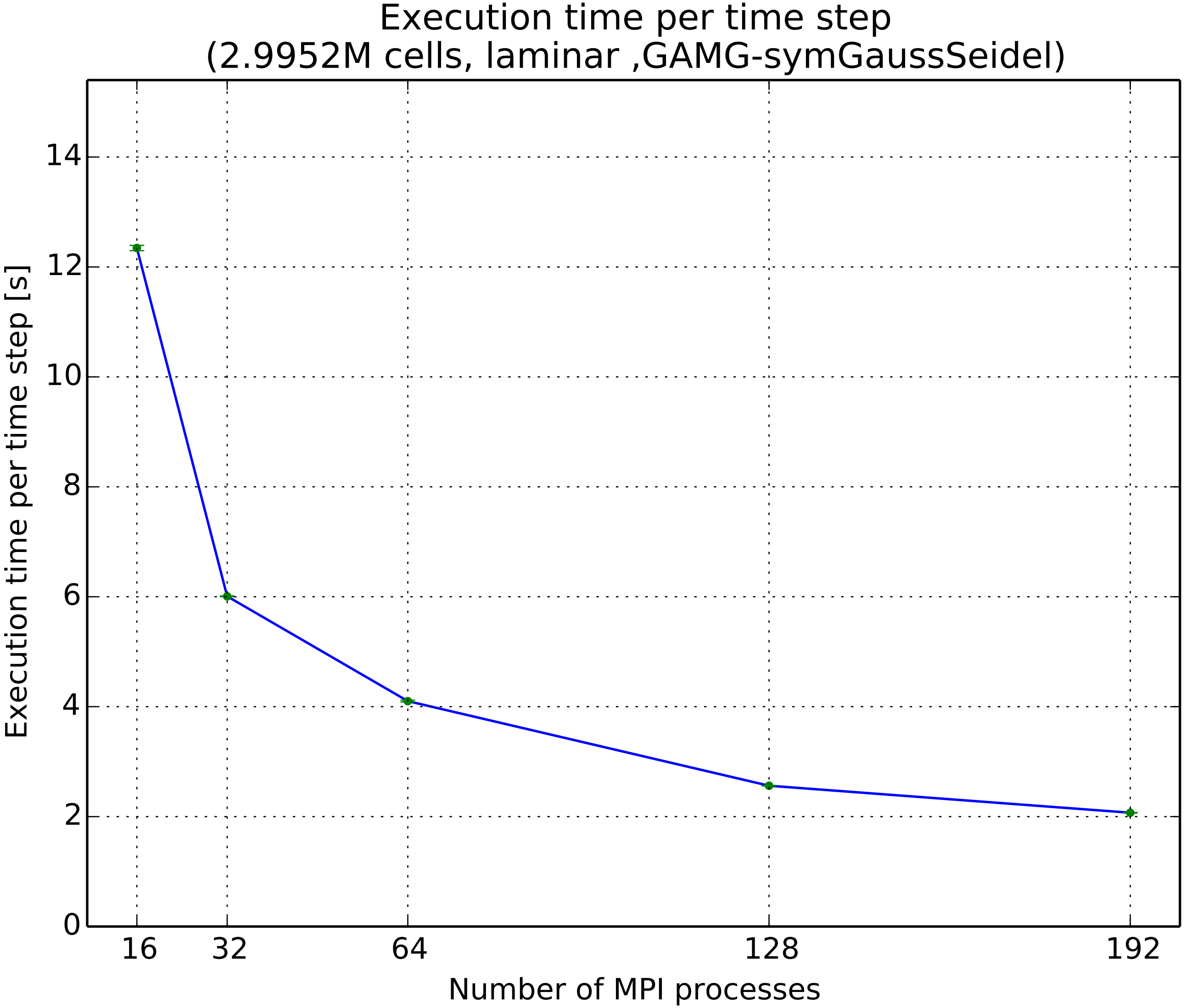
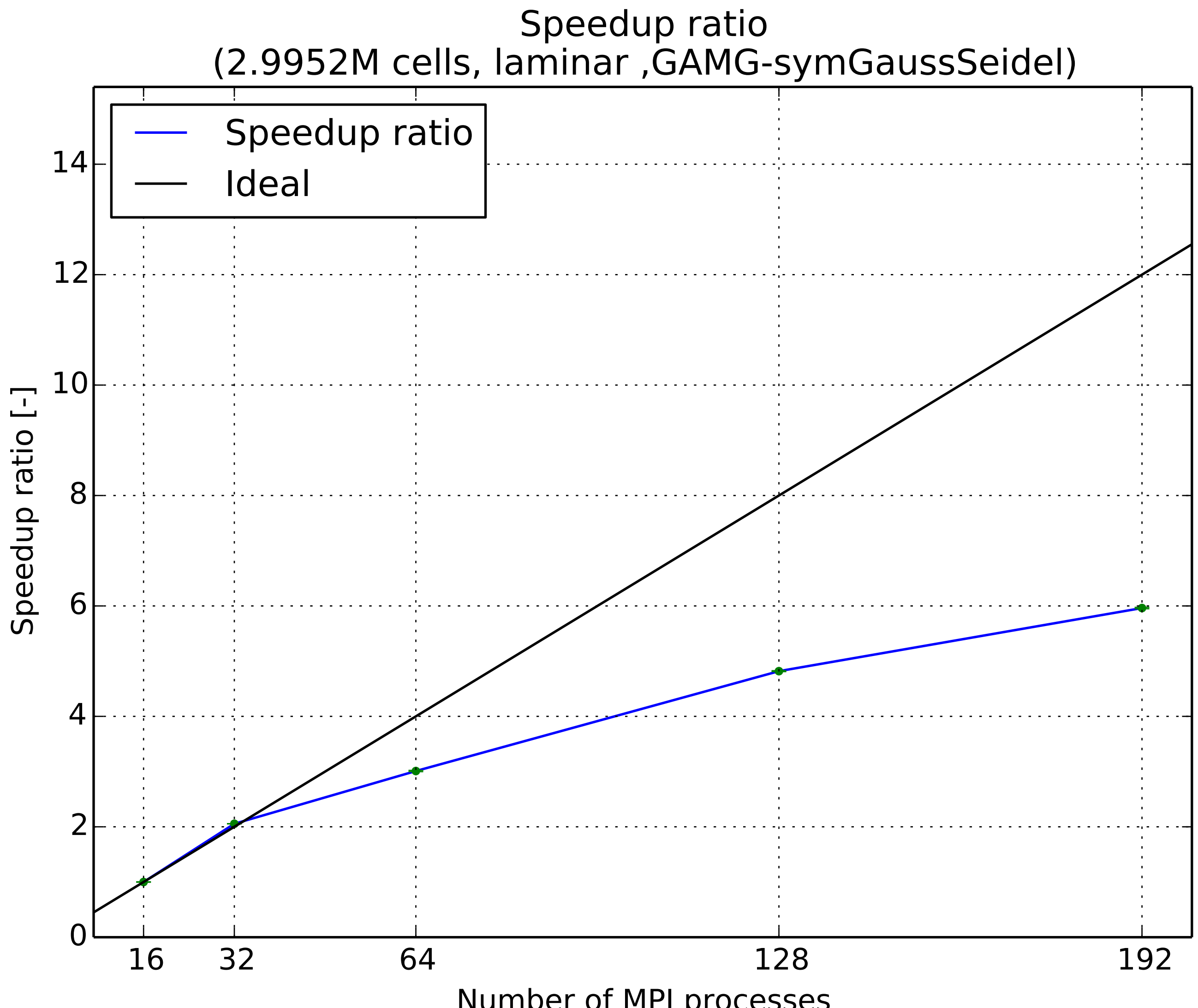
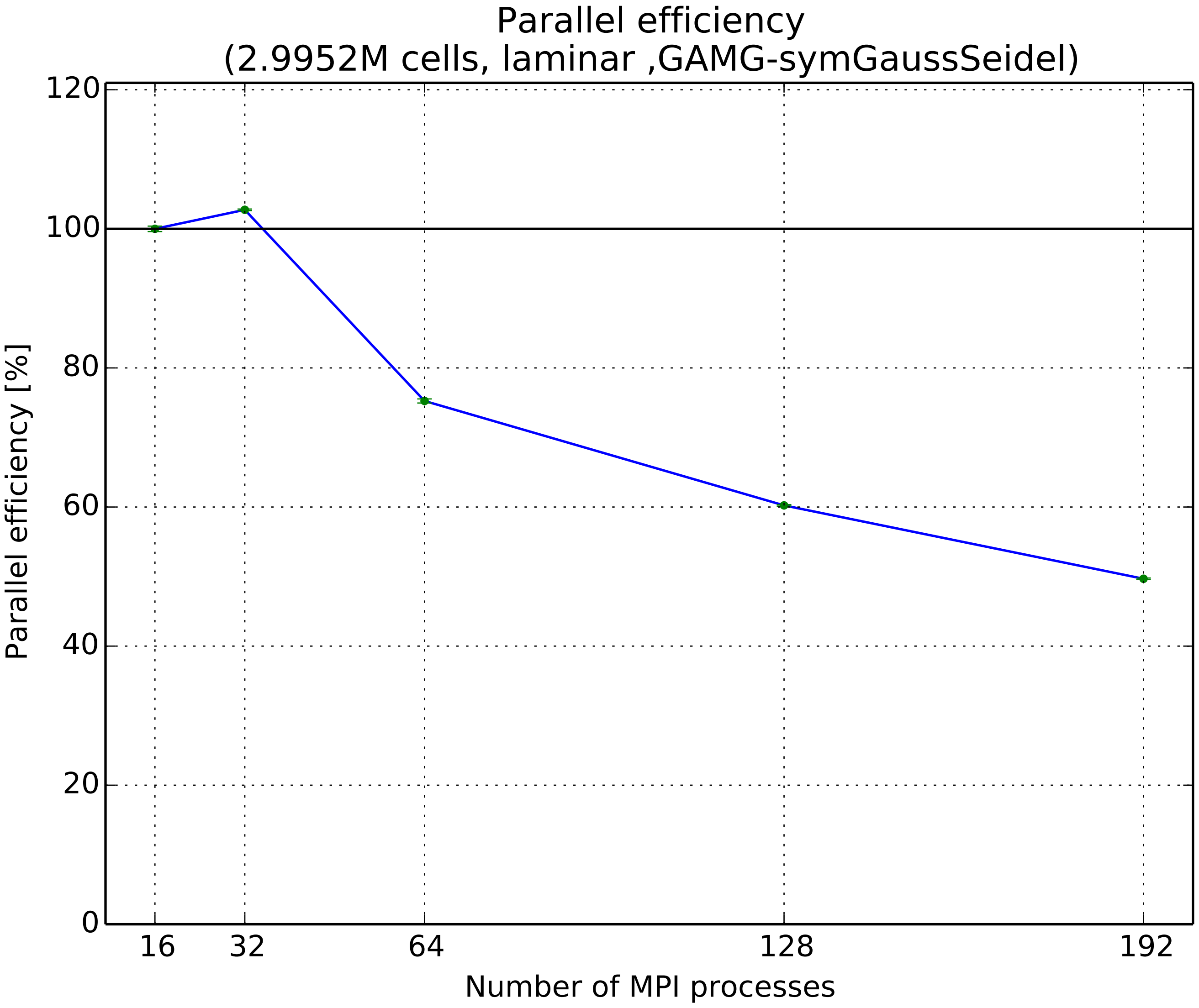
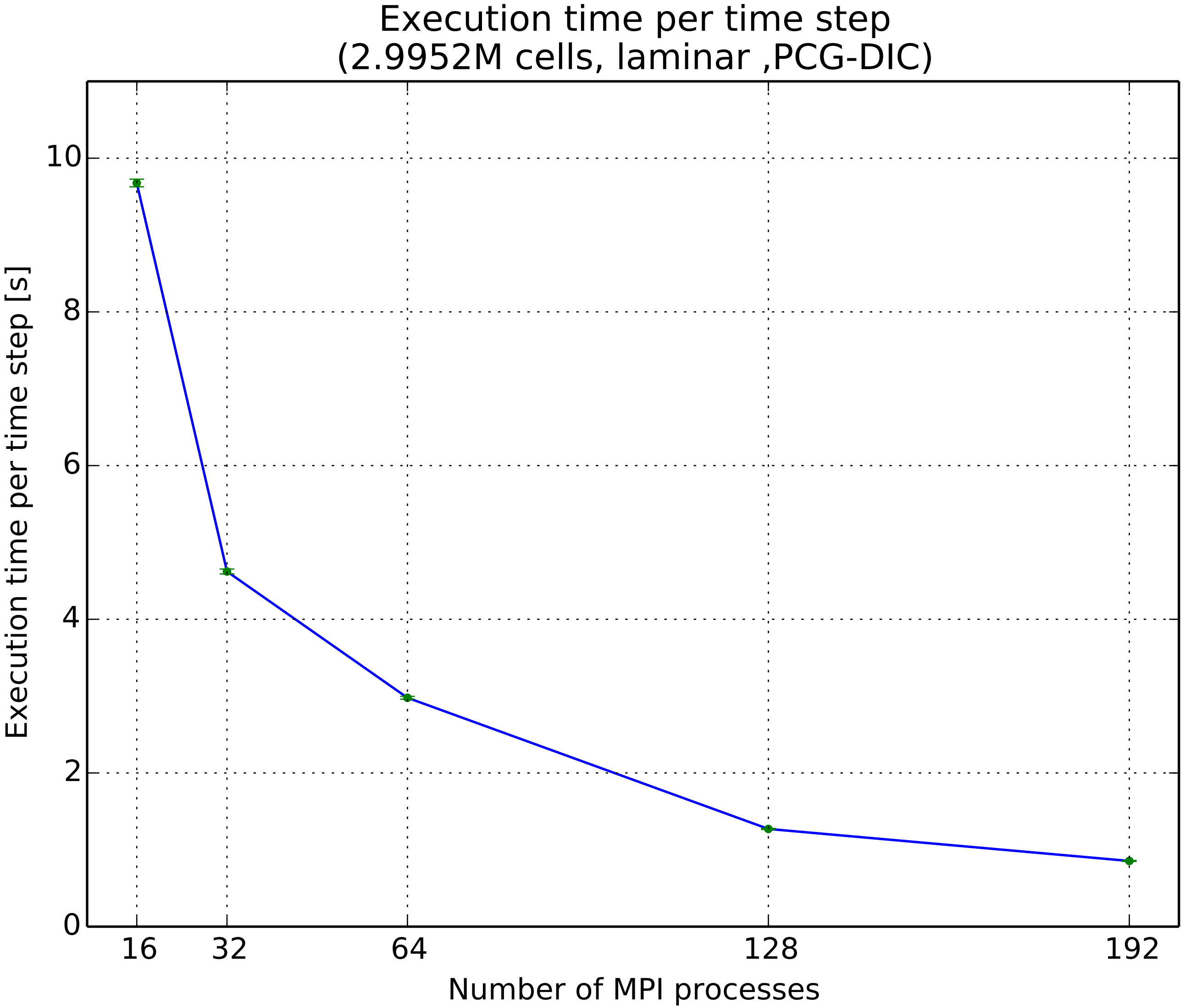
64
128
192
Number of MPI processes

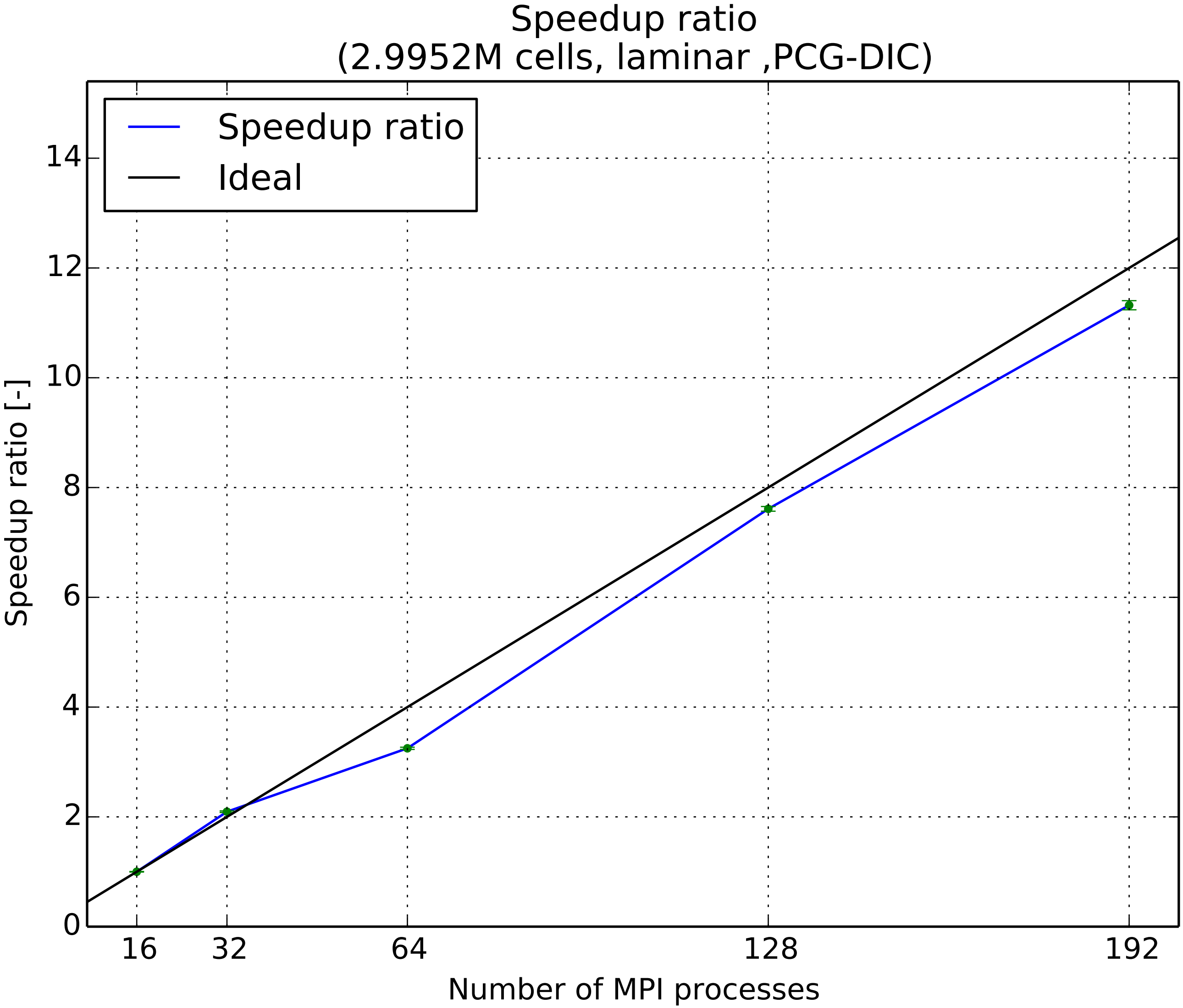

Parallel efficiency
(2.9952M cells, laminar ,GAMG-nonBlockingGaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes

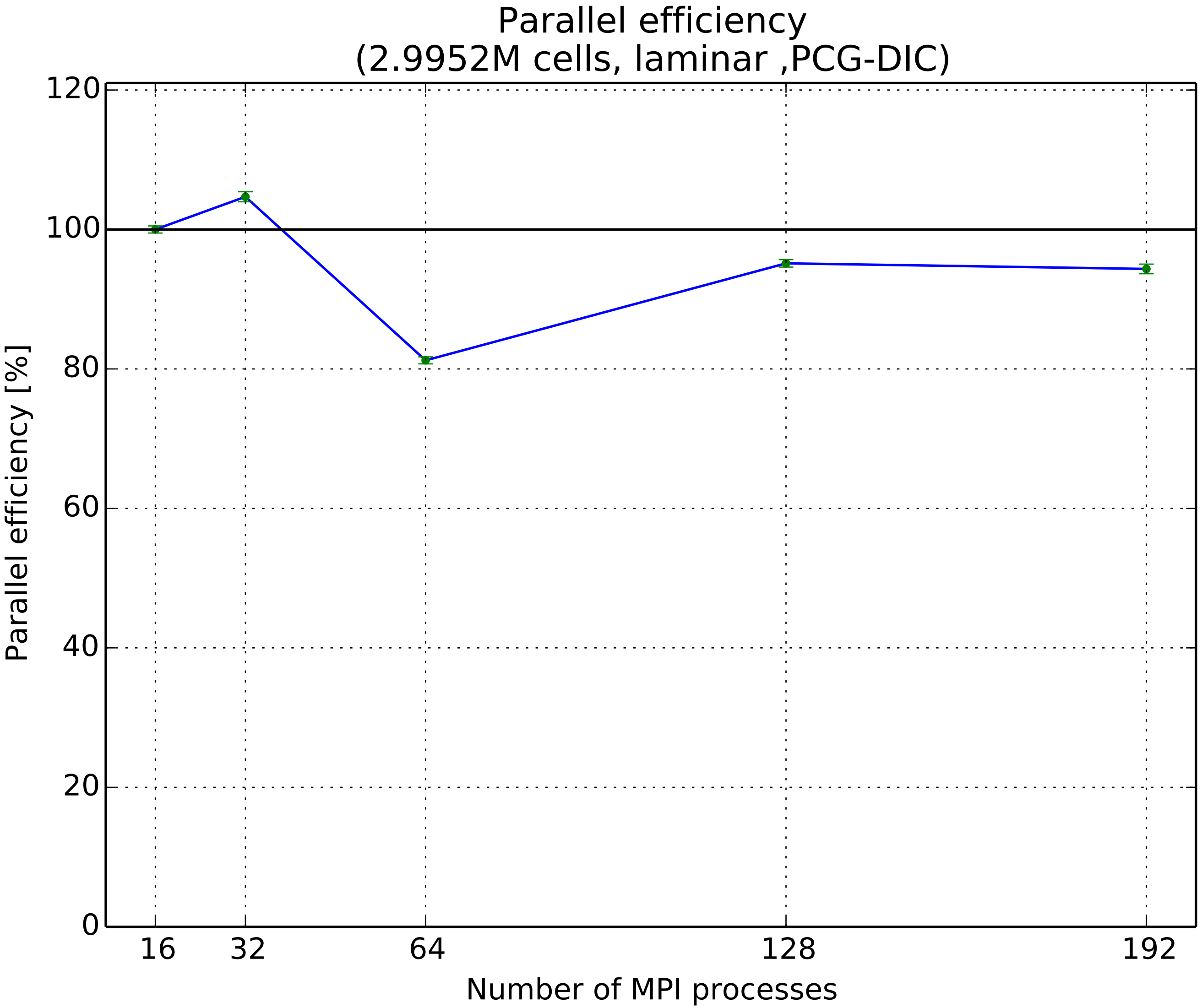

Execution time per time step
(2.9952M cells, laminar ,GAMG-symGaussSeidel)
Execution time per time step [s]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

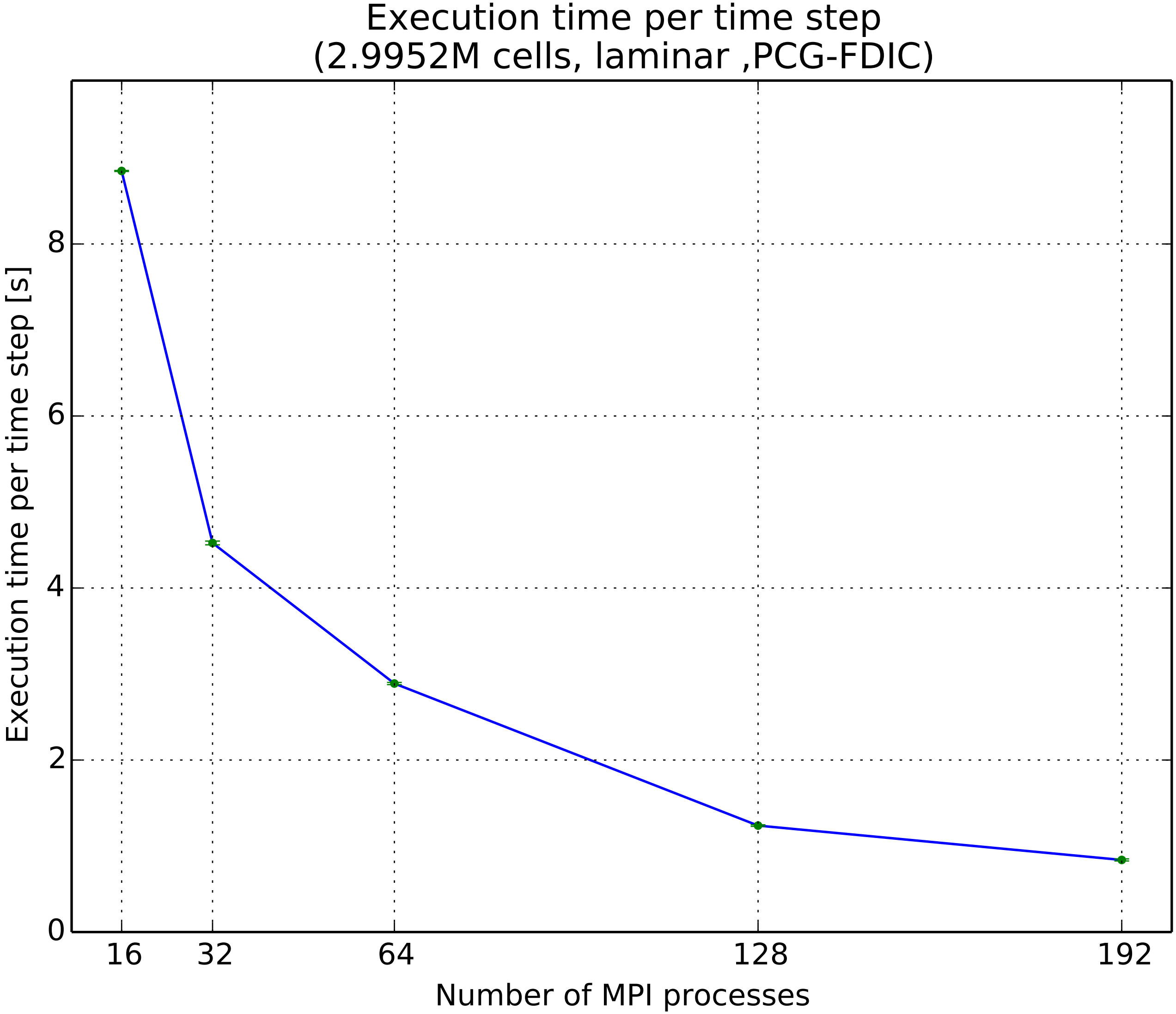

Speedup ratio
(2.9952M cells, laminar ,GAMG-symGaussSeidel)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

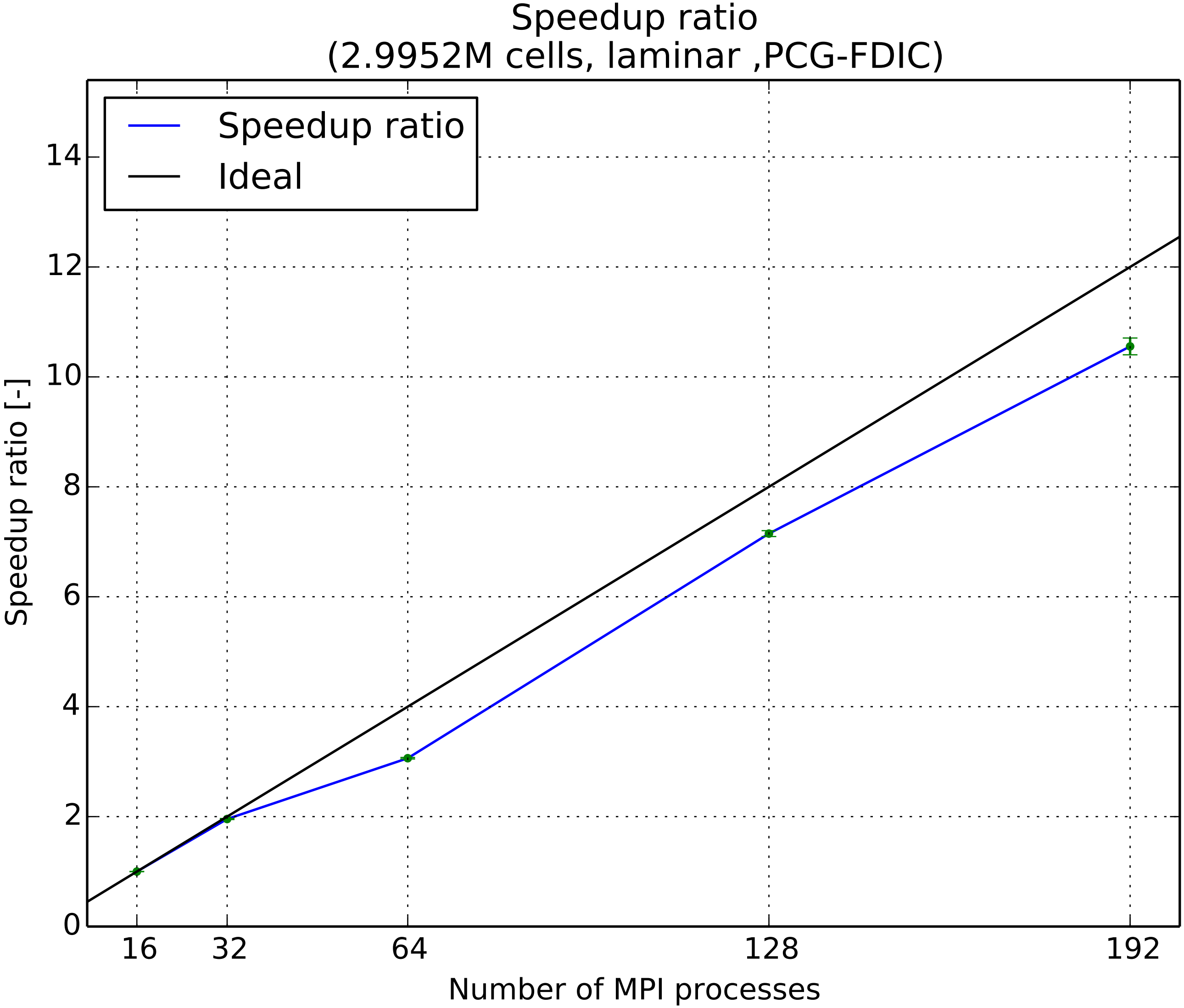

Parallel efficiency
(2.9952M cells, laminar ,GAMG-symGaussSeidel)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes

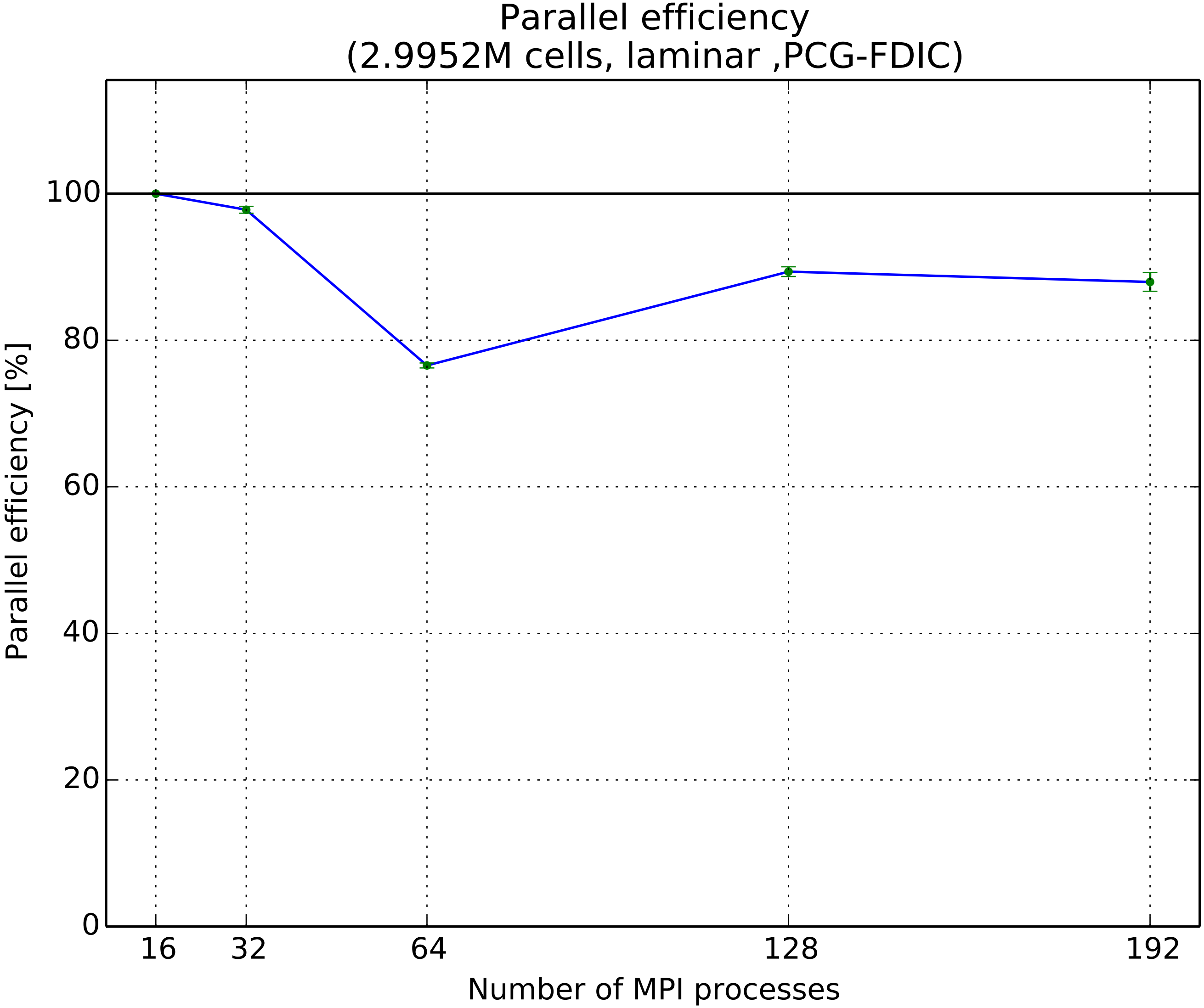

Execution time per time step
(2.9952M cells, laminar ,PCG-DIC)
Execution time per time step [s]
0
2
4
6
8
10
16
32
64
128
192
Number of MPI processes


Speedup ratio
(2.9952M cells, laminar ,PCG-DIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes

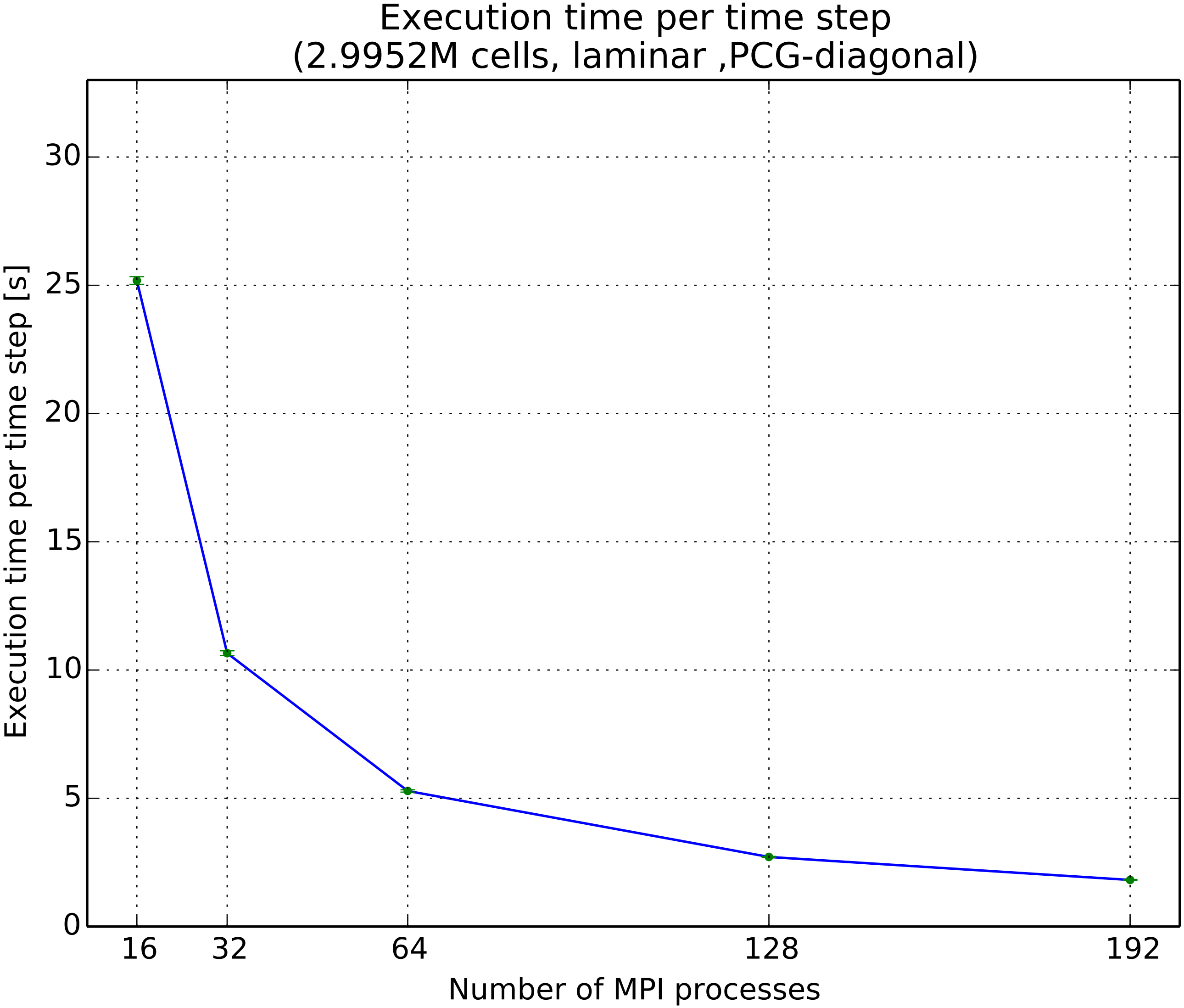

Parallel efficiency
(2.9952M cells, laminar ,PCG-DIC)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes

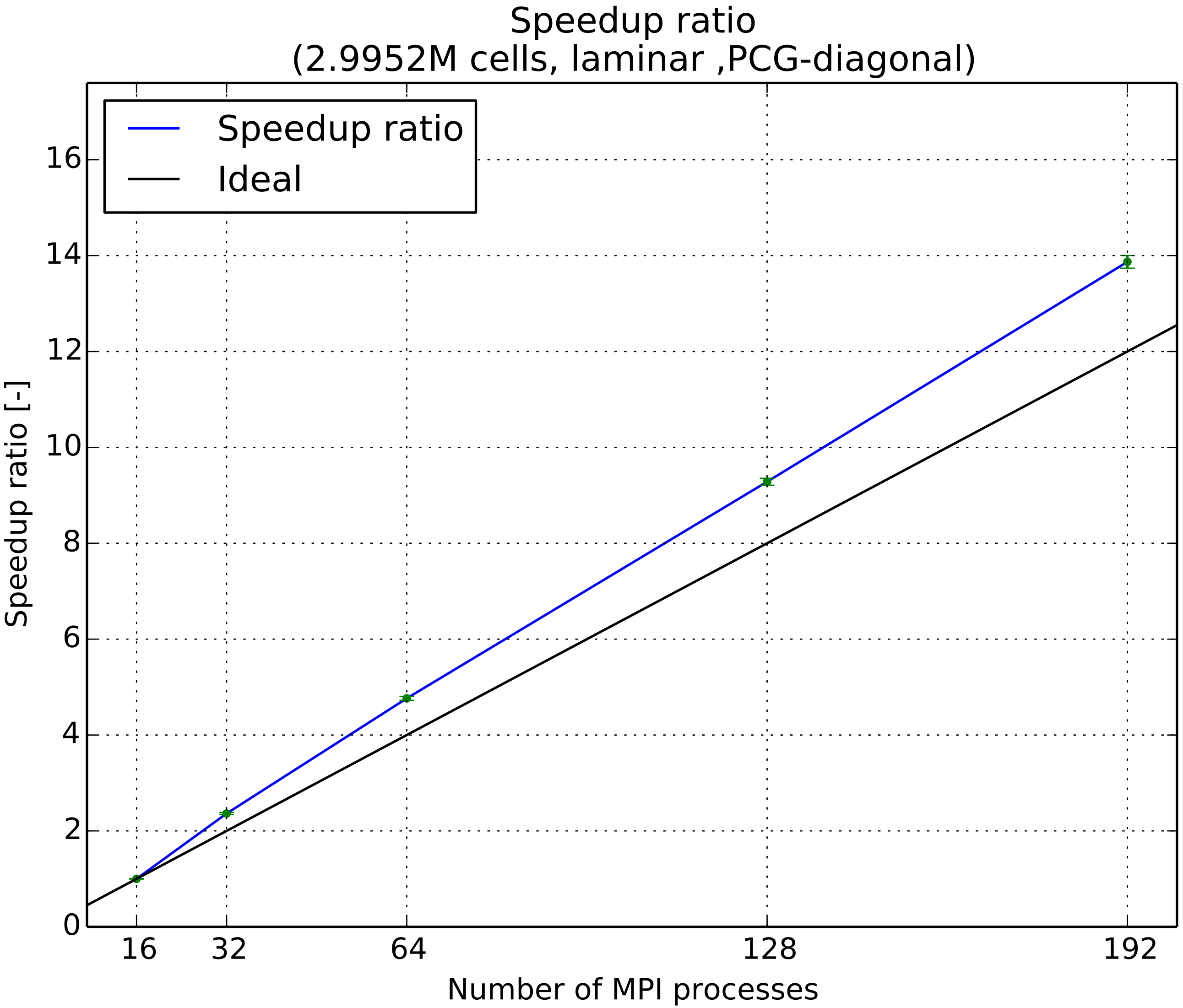

Execution time per time step
(2.9952M cells, laminar ,PCG-FDIC)
Execution time per time step [s]
0
2
4
6
8
16
32
64
128
192
Number of MPI processes

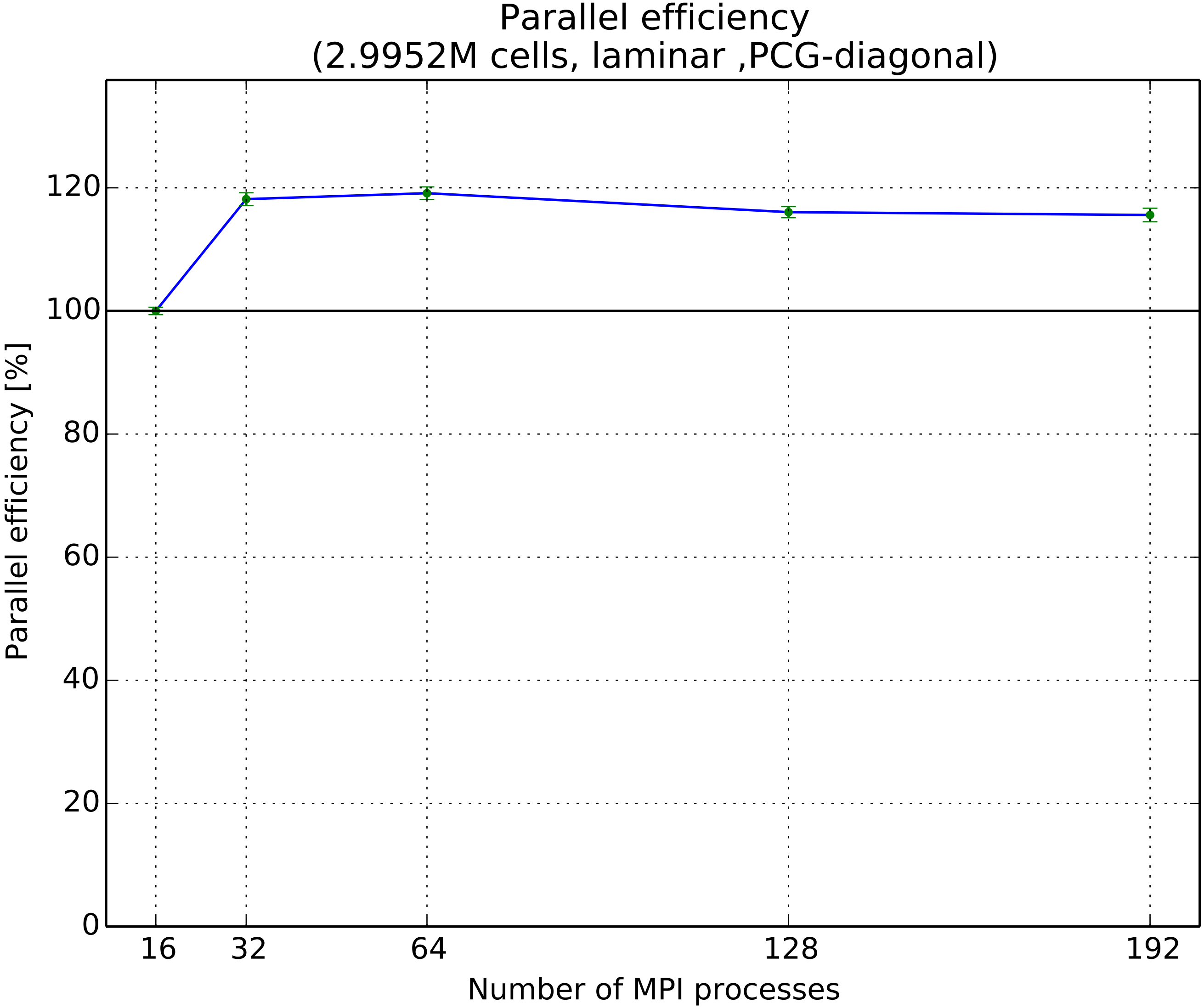

Speedup ratio
(2.9952M cells, laminar ,PCG-FDIC)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
32
64
128
192
Number of MPI processes



Parallel efficiency
(2.9952M cells, laminar ,PCG-FDIC)
Parallel efficiency [%]
0
20
40
60
80
100
16
32
64
128
192
Number of MPI processes


Execution time per time step
(2.9952M cells, laminar ,PCG-diagonal)
Execution time per time step [s]
0
5
10
15
20
25
30
16
32
64
128
192
Number of MPI processes


Speedup ratio
(2.9952M cells, laminar ,PCG-diagonal)
Speedup ratio
Ideal
Speedup ratio [-]
0
2
4
6
8
10
12
14
16
16
32
64
128
192
Number of MPI processes


Parallel efficiency
(2.9952M cells, laminar ,PCG-diagonal)
Parallel efficiency [%]
0
20
40
60
80
100
120
16
32
64
128
192
Number of MPI processes