

-0.16908926275527247  
-0.16905240492390924  
-0.16901474404529523  
-0.1690230773808051  
-0.16907985939166825  
-0.1690837851340347  
-0.1690461237029514  
-0.1690141632287683  
-0.16902778605968327  
-0.16908371256965066  
-0.16908078067628976  
-0.1690447415801855  
-0.16901196403208327  
-0.1690331730108107  
-0.16908783999485094  
-0.16908019793586637  
-0.1690402712372411  
-0.1690066675984578  
-0.1690385994000902  
-0.16909278202635358  
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-0.16903181574745044  
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-0.16904872400310056  
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-0.16907120739400863  
-0.16902491372615408  
-0.16900540285628107  
-0.16906150844188159  
-0.16909732952331732  
-0.1690644502691593  
-0.16901977601925894  
-0.1690087837330578  
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-0.16901607122935722  
-0.1690120209286028  
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-0.1690917696691646  
-0.16905402040535755  
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-0.16903390308621005  
-0.16900274590722159  
-0.1690445930021042  
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-0.16906885423556114  
-0.16902288517135722  
-0.16900341116392284  
-0.16906323202818152  
-0.16909793327535752  
-0.16906372791458668  
-0.16901758963658897  
-0.1690076265522647  
-0.16907413362650595  
-0.16909667012760815  
-0.16905715253841405  
-0.1690117653364976  
-0.16901316541884898  
-0.16908223578123316  
-0.1690918842838546  
-0.16904915672896462  
-0.169008448362541  
-0.16902057135967685  
-0.1690871666019853  
-0.16908658831413792  
-0.16904412116933462  
-0.16900740673823134  
-0.1690293205066871  
-0.1690918027627602  
-0.1690829295940375  
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-0.16900522540599802  
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-0.16909410318885965  
-0.16907846621170364  
-0.16903274720870476  
-0.16900284987917535  
-0.16904628075107403  
-0.16909717678663966  
-0.16907293588690148  
-0.1690262858529143

36003706 function calls in 41.911 seconds

Ordered by: cumulative time

ncalls	totttime	percall	cumtime	percall	
filename:lineno(function)					
1	0.000	0.000	41.911	41.911	{built-in method
builtins.exec}					
1	0.000	0.000	41.911	41.911	nbody_1.py:4(<module>)
1	0.337	0.337	41.911	41.911	nbody_1.py:138(nbody)
2000000	40.182	0.000	41.570	0.000	nbody_1.py:70(advance)
20002000	0.813	0.000	0.813	0.000	{method 'append' of
'list' objects}					
14001401	0.575	0.000	0.575	0.000	{method 'keys' of 'dict'
objects}					
200	0.002	0.000	0.002	0.000	
nbody_1.py:101(report_energy)					
100	0.002	0.000	0.002	0.000	{built-in method
builtins.print}					
1	0.000	0.000	0.000	0.000	{method 'disable' of
'_lsprof.Profiler' objects}					
1	0.000	0.000	0.000	0.000	
nbody_1.py:121(offset_momentum)					

-0.16908926275527025  
-0.16905240492390494  
-0.1690147440452967  
-0.16902307738080996  
-0.16907985939167475  
-0.16908378513403594  
-0.16904612370294356  
-0.16901416322875656  
-0.169027786059668  
-0.16908371256962812  
-0.16908078067626844  
-0.16904474158016541  
-0.16901196403206928  
-0.16903317301080156  
-0.1690878399948368  
-0.16908019793584073  
-0.16904027123721807  
-0.16900666759843433  
-0.16903859940008237  
-0.1690927820263301  
-0.16907709741615898  
-0.1690318157474176  
-0.16900365578741586  
-0.16904872400309137  
-0.16909656666615996

-0.16907120739396314  
-0.16902491372611023  
-0.16900540285625235  
-0.16906150844187284  
-0.16909732952327508  
-0.16906445026910183  
-0.16901977601920565  
-0.16900878373304162  
-0.169069429960914  
-0.16909369812504424  
-0.1690577655084966  
-0.16901607122930815  
-0.16901202092860457  
-0.16907695909884457  
-0.16909176966912898  
-0.16905402040530781  
-0.16901235909922357  
-0.16901736033371176  
-0.16908474596855333  
-0.1690903553467179  
-0.1690483845287476  
-0.169006630340714  
-0.1690233536742349  
-0.1690912414950933  
-0.16908618459853578  
-0.1690401551753759  
-0.16900291923549599  
-0.16903287494401295  
-0.16909558331068023  
-0.16908055117112683  
-0.16903390308611693  
-0.16900274590717324  
-0.169044593002153  
-0.16909854774648347  
-0.169074996973905  
-0.16902883385611475  
-0.16900287426059443  
-0.1690534499390132  
-0.16909778695823155  
-0.16906885423546958  
-0.16902288517126238  
-0.16900341116390946  
-0.1690632320282464  
-0.16909793327529532  
-0.16906372791447294  
-0.16901758963649074  
-0.16900762655228374  
-0.16907413362658358  
-0.1690966701275339  
-0.16905715253829579

```

-0.16901176533640827
-0.1690131654189057
-0.16908223578131068
-0.16909188428377536
-0.1690491567288394
-0.1690084483624549
-0.1690205713597522
-0.16908716660203624
-0.16908658831402987
-0.16904412116919318
-0.1690074067381597
-0.1690293205067914
-0.1690918027627932
-0.16908292959391336
-0.16903991544245178
-0.1690052254059413
-0.16903656773671472
-0.1690941031888828
-0.16907846621158512
-0.16903274720857253
-0.16900284987914624
-0.1690462807512239
-0.16909717678662617
-0.16907293588676073
-0.1690262858527701

```

306005706 function calls in 77.608 seconds

Ordered by: cumulative time

ncalls	tottime	percall	cumtime	percall	
filename:lineno(function)					
1	0.000	0.000	77.608	77.608	{built-in method
builtins.exec}					
1	0.000	0.000	77.608	77.608	nbody_2.py:3(<module>)
1	0.323	0.323	77.608	77.608	nbody_2.py:125(nbody)
2000000	14.085	0.000	77.281	0.000	nbody_2.py:67(advance)
20000000	20.414	0.000	58.014	0.000	nbody_2.py:54(update_vs)
120000000	15.468	0.000	37.600	0.000	nbody_2.py:47(compute_b)
120000000	22.132	0.000	22.132	0.000	
nbody_2.py:51(compute_mag)					
10000000	2.499	0.000	2.499	0.000	nbody_2.py:62(update_rs)
20002000	2.055	0.000	2.055	0.000	
nbody_2.py:44(compute_deltas)					
14001401	0.629	0.000	0.629	0.000	{method 'keys' of 'dict'
objects}					
200	0.002	0.000	0.002	0.000	
nbody_2.py:88(report_energy)					
100	0.002	0.000	0.002	0.000	{built-in method
builtins.print}					
2000	0.000	0.000	0.000	0.000	

```
nbody_2.py:85(compute_energy)
1      0.000      0.000      0.000      0.000 {method 'disable' of
'_lsprof.Profiler' objects}
1      0.000      0.000      0.000      0.000
nbody_2.py:108(offset_momentum)
```

```
-0.16908926275527025
-0.16905240492390494
-0.1690147440452967
-0.16902307738080996
-0.16907985939167475
-0.16908378513403594
-0.16904612370294356
-0.16901416322875656
-0.169027786059668
-0.16908371256962812
-0.16908078067626844
-0.16904474158016541
-0.16901196403206928
-0.16903317301080156
-0.1690878399948368
-0.16908019793584073
-0.16904027123721807
-0.16900666759843433
-0.16903859940008237
-0.1690927820263301
-0.16907709741615898
-0.1690318157474176
-0.16900365578741586
-0.16904872400309137
-0.16909656666615996
-0.16907120739396314
-0.16902491372611023
-0.16900540285625235
-0.16906150844187284
-0.16909732952327508
-0.16906445026910183
-0.16901977601920565
-0.16900878373304162
-0.169069429960914
-0.16909369812504424
-0.1690577655084966
-0.16901607122930815
-0.16901202092860457
-0.16907695909884457
-0.16909176966912898
-0.16905402040530781
-0.16901235909922357
-0.16901736033371176
```

-0.16908474596855333  
-0.1690903553467179  
-0.1690483845287476  
-0.169006630340714  
-0.1690233536742349  
-0.1690912414950933  
-0.16908618459853578  
-0.1690401551753759  
-0.16900291923549599  
-0.16903287494401295  
-0.16909558331068023  
-0.16908055117112683  
-0.16903390308611693  
-0.16900274590717324  
-0.169044593002153  
-0.16909854774648347  
-0.169074996973905  
-0.16902883385611475  
-0.16900287426059443  
-0.1690534499390132  
-0.16909778695823155  
-0.16906885423546958  
-0.16902288517126238  
-0.16900341116390946  
-0.1690632320282464  
-0.16909793327529532  
-0.16906372791447294  
-0.16901758963649074  
-0.16900762655228374  
-0.16907413362658358  
-0.1690966701275339  
-0.16905715253829579  
-0.16901176533640827  
-0.1690131654189057  
-0.16908223578131068  
-0.16909188428377536  
-0.1690491567288394  
-0.1690084483624549  
-0.1690205713597522  
-0.16908716660203624  
-0.16908658831402987  
-0.16904412116919318  
-0.1690074067381597  
-0.1690293205067914  
-0.1690918027627932  
-0.16908292959391336  
-0.16903991544245178  
-0.1690052254059413  
-0.16903656773671472  
-0.1690941031888828

```

-0.16907846621158512
-0.16903274720857253
-0.16900284987914624
-0.1690462807512239
-0.16909717678662617
-0.16907293588676073
-0.1690262858527701

```

326007706 function calls in 82.602 seconds

Ordered by: cumulative time

ncalls	totttime	percall	cumtime	percall	
filename:lineno(function)					
1	0.000	0.000	82.602	82.602	{built-in method
builtins.exec}					
1	0.000	0.000	82.602	82.602	nbody_3.py:3(<module>)
1	0.345	0.345	82.602	82.602	nbody_3.py:87(nbody)
2000000	16.127	0.000	82.253	0.000	nbody_3.py:28(advance)
2000000	21.523	0.000	59.472	0.000	nbody_3.py:15(update_vs)
12000000	15.957	0.000	37.949	0.000	nbody_3.py:8(compute_b)
12000000	21.992	0.000	21.992	0.000	
nbody_3.py:12(compute_mag)					
1000000	2.722	0.000	2.722	0.000	nbody_3.py:23(update_rs)
20002000	2.226	0.000	2.226	0.000	
nbody_3.py:5(compute_deltas)					
20002000	1.001	0.000	1.001	0.000	{method 'append' of
'list' objects}					
14001401	0.705	0.000	0.705	0.000	{method 'keys' of 'dict'
objects}					
200	0.002	0.000	0.003	0.000	
nbody_3.py:49(report_energy)					
100	0.002	0.000	0.002	0.000	{built-in method
builtins.print}					
2000	0.001	0.000	0.001	0.000	
nbody_3.py:46(compute_energy)					
1	0.000	0.000	0.000	0.000	{method 'disable' of
'_lsprof.Profiler' objects}					
1	0.000	0.000	0.000	0.000	
nbody_3.py:69(offset_momentum)					

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-0.16908926275527025
-0.16905240492390494
-0.1690147440452967
-0.16902307738080996
-0.16907985939167475
-0.16908378513403594
-0.16904612370294356
-0.16901416322875656
-0.169027786059668

```



-0.16908371256962812  
-0.16908078067626844  
-0.16904474158016541  
-0.16901196403206928  
-0.16903317301080156  
-0.1690878399948368  
-0.16908019793584073  
-0.16904027123721807  
-0.16900666759843433  
-0.16903859940008237  
-0.1690927820263301  
-0.16907709741615898  
-0.1690318157474176  
-0.16900365578741586  
-0.16904872400309137  
-0.16909656666615996  
-0.16907120739396314  
-0.16902491372611023  
-0.16900540285625235  
-0.16906150844187284  
-0.16909732952327508  
-0.16906445026910183  
-0.16901977601920565  
-0.16900878373304162  
-0.169069429960914  
-0.16909369812504424  
-0.1690577655084966  
-0.16901607122930815  
-0.16901202092860457  
-0.16907695909884457  
-0.16909176966912898  
-0.16905402040530781  
-0.16901235909922357  
-0.16901736033371176  
-0.16908474596855333  
-0.1690903553467179  
-0.1690483845287476  
-0.169006630340714  
-0.1690233536742349  
-0.1690912414950933  
-0.16908618459853578  
-0.1690401551753759  
-0.16900291923549599  
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-0.16909558331068023  
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-0.16900274590717324  
-0.169044593002153  
-0.16909854774648347

```

-0.169074996973905
-0.16902883385611475
-0.16900287426059443
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-0.16902288517126238
-0.16900341116390946
-0.1690632320282464
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-0.16901758963649074
-0.16900762655228374
-0.16907413362658358
-0.1690966701275339
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-0.1690131654189057
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-0.1690293205067914
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-0.16909717678662617
-0.16907293588676073
-0.1690262858527701

```

338004906 function calls in 86.521 seconds

Ordered by: cumulative time

ncalls	tottime	percall	cumtime	percall	
filename:lineno(function)					
1	0.000	0.000	86.521	86.521	{built-in method
builtins.exec}					
1	0.000	0.000	86.521	86.521	nbody_4.py:4(<module>)

1	0.323	0.323	86.521	86.521	nbody_4.py:131(nbody)
2000000	13.993	0.000	86.194	0.000	nbody_4.py:71(advance)
20000000	20.519	0.000	58.216	0.000	nbody_4.py:56(update_vs)
120000000	15.307	0.000	37.697	0.000	nbody_4.py:48(compute_b)
120000000	22.389	0.000	22.389	0.000	
nbody_4.py:52(compute_mag)					
10000000	7.596	0.000	11.795	0.000	nbody_4.py:65(update_rs)
40000000	4.199	0.000	4.199	0.000	nbody_4.py:66(<genexpr>)
20002000	1.898	0.000	1.898	0.000	
nbody_4.py:45(compute_deltas)					
4000401	0.205	0.000	0.205	0.000	{method 'keys' of 'dict' objects}
2000200	0.088	0.000	0.088	0.000	{built-in method builtins.len}
200	0.001	0.000	0.002	0.000	
nbody_4.py:94(report_energy)					
100	0.001	0.000	0.001	0.000	{built-in method builtins.print}
2000	0.001	0.000	0.001	0.000	
nbody_4.py:91(compute_energy)					
1	0.000	0.000	0.000	0.000	{method 'disable' of '_lsprof.Profiler' objects}
1	0.000	0.000	0.000	0.000	
nbody_4.py:114(offset_momentum)					

-0.16908926275527247  
 -0.16905240492390924  
 -0.16901474404529523  
 -0.1690230773808051  
 -0.16907985939166825  
 -0.1690837851340347  
 -0.1690461237029514  
 -0.1690141632287683  
 -0.16902778605968327  
 -0.16908371256965066  
 -0.16908078067628976  
 -0.1690447415801855  
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 -0.16908783999485094  
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 -0.1690402712372411  
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 -0.1690385994000902  
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 -0.1690770974161892  
 -0.16903181574745044  
 -0.1690036557874394  
 -0.16904872400310056

-0.16909656666618994  
-0.16907120739400863  
-0.16902491372615408  
-0.16900540285628107  
-0.16906150844188159  
-0.16909732952331732  
-0.1690644502691593  
-0.16901977601925894  
-0.1690087837330578  
-0.16906942996090188  
-0.1690936981250797  
-0.16905776550855375  
-0.16901607122935722  
-0.1690120209286028  
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-0.1690917696691646  
-0.16905402040535755  
-0.1690123590992571  
-0.1690173603336838  
-0.16908474596853762  
-0.16909035534676325  
-0.16904838452880716  
-0.16900663034075925  
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-0.16909124149510318  
-0.1690861845986069  
-0.16904015517546525  
-0.16900291923555874  
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-0.16900287426061228  
-0.16905344993893573  
-0.16909778695826366  
-0.16906885423556114  
-0.16902288517135722  
-0.16900341116392284  
-0.16906323202818152  
-0.16909793327535752  
-0.16906372791458668  
-0.16901758963658897  
-0.1690076265522647  
-0.16907413362650595  
-0.16909667012760815

```

-0.16905715253841405
-0.1690117653364976
-0.16901316541884898
-0.16908223578123316
-0.1690918842838546
-0.16904915672896462
-0.169008448362541
-0.16902057135967685
-0.1690871666019853
-0.16908658831413792
-0.16904412116933462
-0.16900740673823134
-0.1690293205066871
-0.1690918027627602
-0.1690829295940375
-0.16903991544259647
-0.16900522540599802
-0.16903656773656767
-0.16909410318885965
-0.16907846621170364
-0.16903274720870476
-0.16900284987917535
-0.16904628075107403
-0.16909717678663966
-0.16907293588690148
-0.1690262858529143

```

42000608 function calls in 41.794 seconds

Ordered by: cumulative time

ncalls	totttime	percall	cumtime	percall	
filename:lineno(function)					
1	0.000	0.000	41.794	41.794	{built-in method
builtins.exec}					
1	0.000	0.000	41.794	41.794	nbody_opt.py:4(<module>)
1	0.000	0.000	41.794	41.794	nbody_opt.py:61(nbody)
100	38.350	0.383	41.792	0.418	nbody_opt.py:6(advance)
40000000	3.365	0.000	3.365	0.000	
nbody_opt.py:24(<genexpr>)					
2000201	0.077	0.000	0.077	0.000	{method 'keys' of 'dict'
objects}					
200	0.001	0.000	0.001	0.000	
nbody_opt.py:26(report_energy)					
100	0.001	0.000	0.001	0.000	{built-in method
builtins.print}					
1	0.000	0.000	0.000	0.000	{method 'disable' of
'_lsprof.Profiler' objects}					
1	0.000	0.000	0.000	0.000	
nbody_opt.py:43(offset_momentum)					
1	0.000	0.000	0.000	0.000	<frozen

```
importlib._bootstrap>:1009(_handle_fromlist)
      1      0.000      0.000      0.000      0.000 {built-in method
builtins.hasattr}
```