PyLattice Notes

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1 Introduction

This python package is intended for Lattice theories research.

2 Linear Algebra

2.1 Scalar

Real

Complex

2.2 Vectors

VectorReal

VectorComplex

2.3 Matrix

RealMatrix

 ${\tt ComplexMatrix}$

Identity

2.4 Matrix Vector

VectorRealMatrix

VectorComplexMatrix

3 Lattice Objects

3.1 Lattice Scalar

LatticeReal

LatticeComplex

3.2 Lattice Matrix

LatticeRealMatrix

 ${\tt LatticeComplexMatrix}$

3.3 Lattice Vector

LatticeVectorReal

LatticeVectorComplex

3.4 Lattice Vector Matrix

LatticeVectorRealMatrix

 ${\tt LatticeVectorComplexMatrix}$

4 Parallelization

 $idx(\mathbf{x}, \mathbf{x})$ (1)

4.1 communication

4.2 I/O

LatticeBase, LatticeMPI

	$i_{1,1}^{0,0}$ $i_{1,2}^{0,0}$ $i_{1,3}^{0,0}$	$i_{1,4}^{0,1}$ $i_{1,5}^{0,1}$ $i_{1,6}^{0,1}$	$i_{1,6}^{0,0}$ $i_{1,1}^{0,0}$ $i_{1,2}^{0,0}$	$i_{1,3}^{0,1}$ $i_{1,4}^{0,1}$ $i_{1,5}^{0,1}$
$i_{1,1}$ $i_{1,2}$ $i_{1,3}$ $i_{1,4}$ $i_{1,5}$ $i_{1,6}$	$i_{2,1}^{0,0}$ $i_{2,2}^{0,0}$ $i_{2,3}^{0,0}$	$i_{2,4}^{0,1}$ $i_{2,5}^{0,1}$ $i_{2,6}^{0,1}$	$i_{2,6}^{0,0}$ $i_{2,1}^{0,0}$ $i_{2,2}^{0,0}$	$i_{2,3}^{0,1}$ $i_{2,4}^{0,1}$ $i_{2,5}^{0,1}$
$i_{2,1}$ $i_{2,2}$ $i_{2,3}$ $i_{2,4}$ $i_{2,5}$ $i_{2,6}$	$i_{3,1}^{0,0}$ $i_{3,2}^{0,0}$ $i_{3,3}^{0,0}$	$i_{3,4}^{0,1}$ $i_{3,5}^{0,1}$ $i_{3,6}^{0,1}$	$i_{3,6}^{0,0}$ $i_{3,1}^{0,0}$ $i_{3,2}^{0,0}$	$\begin{vmatrix} i_{3,3}^{0,1} \end{vmatrix} i_{3,4}^{0,1} i_{3,5}^{0,1}$
$i_{3,1}$ $i_{3,2}$ $i_{3,3}$ $i_{3,4}$ $i_{3,5}$ $i_{3,6}$	$i_{4,1}^{1,0}$ $i_{4,2}^{1,0}$ $i_{4,3}^{1,0}$	$i_{4,4}^{1,1}$ $i_{4,5}^{1,1}$ $i_{4,6}^{1,1}$	$i_{4,6}^{1,0}$ $i_{4,1}^{1,0}$ $i_{4,2}^{1,0}$	$i_{4,3}^{1,1}$ $i_{4,4}^{1,1}$ $i_{4,5}^{1,1}$
$i_{4,1}$ $i_{4,2}$ $i_{4,3}$ $i_{4,4}$ $i_{4,5}$ $i_{4,6}$ $i_{5,1}$ $i_{5,2}$ $i_{5,3}$ $i_{5,4}$ $i_{5,5}$ $i_{5,6}$	$i_{5,1}^{1,0}$ $i_{5,2}^{1,0}$ $i_{5,3}^{1,0}$	$i_{5,4}^{1,1}$ $i_{5,5}^{1,1}$ $i_{5,6}^{1,1}$	$i_{5,6}^{1,0}$ $i_{5,1}^{1,0}$ $i_{5,2}^{1,0}$	$i_{5,3}^{1,1}$ $i_{5,4}^{1,1}$ $i_{5,5}^{1,1}$
$i_{6,1}$ $i_{6,2}$ $i_{6,3}$ $i_{6,4}$ $i_{6,5}$ $i_{6,6}$	$\begin{bmatrix} i_{6,1}^{1,0} & i_{6,2}^{1,0} \\ \end{bmatrix} i_{6,3}^{1,0}$	$i_{6,4}^{1,1}$ $i_{6,5}^{1,1}$ $i_{6,6}^{1,1}$	$i_{6,6}^{1,0}$ $i_{6,1}^{1,0}$ $i_{6,2}^{1,0}$	$i_{6,3}^{1,1}$ $i_{6,4}^{1,1}$ $i_{6,5}^{1,1}$

Figure 1: Lattice partitioning for 4 processes. Halo boundaries are highlighted in the axis 1.

5 Example

Ising Model