partra User's Guide

Michael Assis

February 18, 2015

1 Introduction

partra is a C library for computing exact partition functions of models in statistical mechanics.

Currently partra can compute transfer matrices for the isotropic Ising model, the isotropic Ising model in a field, the isotropic q-state Potts model, and the isotropic q-state Potts model in a field (acting on only one q-state).

The transfer matrices can have either free or cylindrical boundary conditions. Either the full or reduced sector transfer matrix can be computed. For free boundary conditions, reduced means the reflection symmetric (positive parity) sector. Depending on the lattice, the full free transfer matrix may not be a direct sum of parity sectors, so care must be used in using and interpreting this function for arbitrary lattices. For cylindrical boundary conditions, reduced means the rotationally invariant (momentum zero) and reflection symmetric (positive parity) sector. Depending on the lattice, the full cylindrical transfer matrix may not be a direct sum of momentum and parity sectors, or only of momentum and not parity, so care must be used in using and interpreting this function for arbitrary lattices.

Currently partra computes the transfer matrices on either the square or triangular lattices.

Use the corner case N=1 with caution.

partra is built to be cross-platform compatible. It has been very carefully to adhere to ANSI C only, and to not assume the number of bits in a byte/char, the number of bits in long longs, etc.