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Parity doubling of nucleons and Delta baryons across the deconfinement phase transition

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At zero temperature nucleons and their parity partners have non-degenerate masses due to spontaneous breaking of chiral symmetry.

However, chiral symmetry is expected to be restored at sufficiently high temperature, in particular when going from the hadronic to the quark-gluon plasma (QGP) phase, implying that the parity partners should become degenerate.

We study the nucleon (spin 1/2) and Delta (spin 3/2) baryons in both parity sectors for a range of temperatures in the confined and QGP phases.

Using anisotropic $N_f = 2 + 1$ flavour simulations, we analyse the correlation functions and the spectral functions

using respectively exponential fits and the Maximum Entropy Method.

We find a clear sign of parity doubling for both baryons in the QGP phase:

the parity state masses become degenerate and

their corresponding correlators become essentially identical.

Author: Mr DE BONI, Davide (Swansea University)

Co-authors: Dr JÄGER, Benjamin (Swansea University); Ms PRAKI, Chrisanthi (Swansea University); Prof. ALLTON, Christopher (Swansea University); Prof. AARTS, Gert (Swansea University); Dr SKULLERUD, Jon-Ivar (Maynooth University); Prof. HANDS, Simon (Swansea University)

Presenter: Mr DE BONI, Davide (Swansea University)

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