Contribution ID: **62** Type: **Talk in workshop 1 "Non-perturbative approaches for hadron structure from low to high energy"**

The Proton Size Revealed through the Energy Momentum Tensor Form Factors

Wednesday 29 October 2025 15:00 (25 minutes)

The size of the proton has traditionally been defined by its charge radius, neglecting the role of gluons despite their dominance in its structure. Here we report the first global experimental extraction of the proton's total scalar energy density, reconstructed from near-threshold J/ψ production data to provide the gluonic contribution and the quark contribution from DVCS. We show that the total scalar field defines the proton's largest spatial extent, exceeding both mass and charge radii, and thus sets the effective size of the proton. This result fundamentally reframes our understanding of nucleon structure and highlights the central role of gluons in shaping visible matter.

Author: Dr MEZIANI, Zein-Eddine (Argonne National Laboratory)

Presenter: Dr MEZIANI, Zein-Eddine (Argonne National Laboratory)

Session Classification: Parallel Workshop 1