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Science of the Cosmos

Contribution ID: **89**   Type: **not specified**

Unified hadron-quark EoS based on DDRMF with a sharp phase transition

In this talk, I'll present EVA-01, a unified hadron-quark equation of state developed by extending a density-dependent RMF model with a Polyakov-inspired scalar field, following the philosophy of the CMF model: hadrons and quarks are described within a single effective Lagrangian, and the deconfinement transition is driven by the sacalar field. Although both EVA-01 and CMF implement the Maxwell construction to model the hadron-quark transition, the former is explicitly designed to enforce pure phase separation across the entire phase diagram, avoiding mixed or overlapping populations, what we refer to as cross-contamination. I'll show how this feature impacts the composition and structure of hybrid stars, the evolution of proto-neutron stars, and discuss its implications for the phase diagram of the model.

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