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The special point - a tool to extract the hybrid equation of state from neutron star observations.

Friday 8 April 2022 14:04 (4 minutes)

In my talk, I will present the results of a systematic investigation of the possible locations of the special point (SP), a unique feature of hybrid neutron stars manifesting in their mass-radius relation. The study demonstrates that the SP is invariant both to the choice of the low density hadronic equation of state (EoS) as well as to the two phase transition construction. This is shown in [1,2,3], where the SP is used to interpret the novel multi-messenger neutron star observations in the context of hybrid stars with a deconfined quark matter core. The result is an estimate on the statistics of a measurement that could be considered as indisputable evidence for the hybrid nature of high mass stars, as well as a demonstration of a reversal in the common paradigm of hybrid star compactness. The study produced massive hybrid stars of decreasing compactness in agreement with the latest NICER measurement of pulsar PSR J0740+6620.

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References:

- [1] Cierniak, M., Blaschke, D., 2021, Astron. Nachr., 342, 5, 819. <https://doi.org/10.1002/asna.202114000>
- [2] Blaschke, D., Cierniak, M., 2021, Astron. Nachr., 342, 1-2, 227. <https://doi.org/10.1002/asna.202113909>
- [3] Cierniak, M., Blaschke, D., 2020, Eur. Phys. J. Spec. Top. 229, 3663. <https://doi.org/10.1140/epjst/e2020-000235-5>

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