The Multiple Personalities of Neutron Matter

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From low to high densities, neutron matter offers the opportunity to explore fundamentally important phenomena. Those include: similarity to a unitary Fermi gas, pairing gaps, superfluidity, and more.

In this presentation, we will first discuss our most recent results on neutron matter and the symmetry energy in light of the outcome from the recently completed CREX experiment [1], which contrasts the PREX-II result [2].

We will then present our current work on some of the remarkable features of low-density neutron matter, which originate from its natural proximity to the unitary limit. All of our predictions are obtained within the framework of chiral effective field theory.

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References

[1] D. Adhikari *et al.* (the CREX Collaboration), "Precision Determination of the Neutral Weak Form Factor of ^{48}Ca", *Phys. Rev. Lett.* **129** (2022) 042501.

[2] B.T. Reed, F.J. Fattoyev, C.J. Horowitz, J. Piekarewicz, " Implications of PREX-II on the equation of state of neutron-rich matter", *Phys. Rev. Lett.* **126** (2021) 172503.