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Hans A. Bethe Prize (2020): Ultraluminous X-ray Sources: Extremes of Accretion and the Search for Intermediate Mass Black Holes

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Ultraluminous X-ray sources (ULXs) are bright point sources found in nearby galaxies that are offset from the nucleus, and are therefore not associated with a central supermassive black hole. Because the apparent luminosity exceeds the Eddington limit for a 10 Solar mass black hole by factors of up to one thousand, ULXs were long believed to harbor intermediate mass black holes. Recently, it has been demonstrated that some ULXs in fact contain neutron stars, challenging our understanding of accretion onto magnetized compact objects. I will review the current observational status, and speculate on the nature of the compact objects in the population as a whole.