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Scalarized Neutron Stars in Scalar-tensor Theories: Analytic Charges and Universal Relations[1] KENT YAGI, MICHAEL STEPNICZKA, University of Virginia — Neutron stars in scalar-tensor theories may undergo spontaneous scalarization, which is important for probing the theories with binary pulsar and gravitational wave observations. Since the effect is nonlinear, most studies of spontaneous scalarization were carried out numerically. In this talk, I explain how one can understand and compute the effect of scalarization analytically based on a perturbative analysis and analytic modeling of neutron stars through the Tolman VII solution. I show that the analytic calculations match accurately with numerical ones. We also discovered a universal relation between the scalar charge and the stellar binding energy that is insensitive to the underlying equation of state. These findings improve our understanding of spontaneous scalarization and provide us quick and ready-to-use expressions of scalar charges.

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