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Relativistic theory of tidal Love numbers ERIC POISSON, TAYLOR BINNINGTON, University of Guelph — In Newtonian gravitational theory, a tidal Love number k_l relates the mass multipole moment Q_l created on a spherical body to the applied tidal field E_l; the integer $l \geq 2$ is the multipole order. The relation is of the form $Q_l = k_l a^{2l+1} E_l$, where a is the radius of the unperturbed body. The Love number is dimensionless, and it encodes information about the body's internal structure. In this talk we present a relativistic theory of Love numbers, which applies to compact bodies with strong internal gravity; our theory extends and completes the previous work of Flanagan and Hinderer (2007) and Hinderer (2008). We consider a spherical body deformed by an external tidal field, and we provide precise and meaningful definitions for electric-type and magnetic-type Love numbers; and we compute these numbers for polytropic equations of state. The theory applies to black holes as well, and we find that the relativistic Love numbers of a nonrotating black hole are all zero.

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