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Maximum elastic deformations of relativistic stars NATHAN JOHNSON-MCDANIEL, University of Jena, BENJAMIN OWEN, Penn State — Deformed neutron stars are a prominent potential source of gravitational waves, and there are active searches for waves from such sources by the LIGO/Virgo collaboration. It is thus of considerable interest to know the maximum deformation that could be obtained for various models of neutron stars. We present here the first general relativistic calculations of such maximum quadrupoles in the case of elastic deformations. We consider the standard case of the quadrupoles generated by crustal deformations, and the somewhat more speculative case of quadrupoles generated by deformations of the hadron-quark mixed phase in hybrid stars, where we use our recent calculation of the shear modulus. In both cases, we find relativistic suppressions of the maximum quadrupole, compared with the standard, Newtonian calculations; these suppressions can be as large as a factor of 6 for the crustal quadrupoles of massive, compact stars. But even with these suppressions, maximally strained hybrid stars can still sustain quadrupoles large enough that they could have been detected in recent LIGO/Virgo searches (assuming that the large breaking strain recently calculated for the crust is applicable to the mixed phase in the core).

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