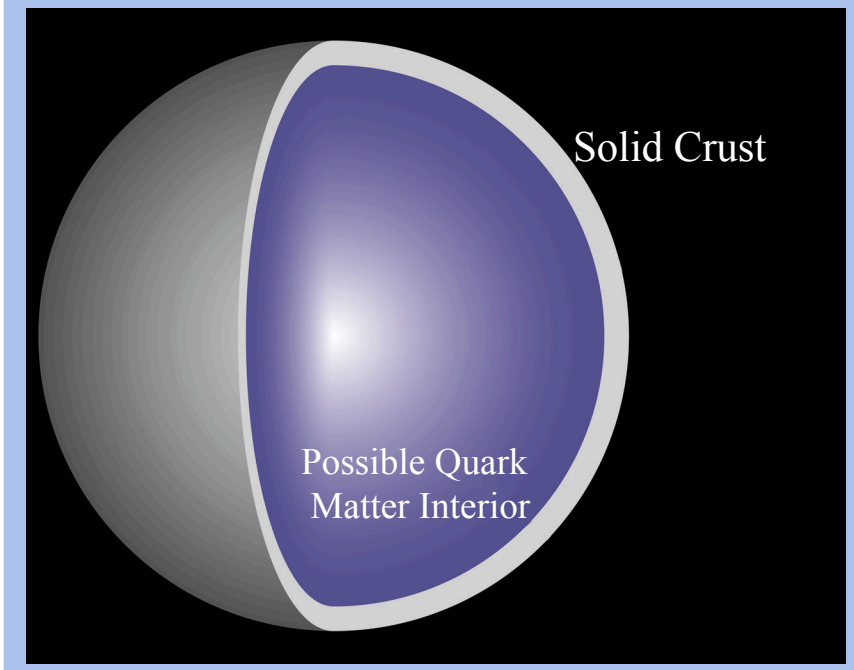
How high a hill can you make on a neutron star?



The image above illustrates how some remnant stars may be made up of quark matter rather than neutrons. Gravitational waves generated by some quark stars may be detectable by the LIGO gravitational wave experiment.

Up to a thousand times higher than we thought, if it's not made of neutrons. That's only a few feet, but for the densest matter in the universe a few feet makes a difference.

Theorists have long speculated that stranger things than neutrons lurk in the hearts of neutron stars – quark matter, for example. Ben Owen of the *Center for Gravitational Wave Physics* has shown that such matter, if solid, can sustain much larger hills than normal neutron star matter, which acts like a liquid except for a thin crust on top.

Owen shows that gravitational waves emitted from such hills as the star rotates are detectable by LIGO now, allowing scientists to probe whether or not such exotic matter exists. Properties of such stars might also explain pulsar glitches - rapid changes in the spin rate- and recent gamma-ray flares from magnetized neutron stars.

B. J. Owen, Physical Review Letters 95, 211101 (2005)

This work was supported in part by the NSF Center for Gravitational Wave Physics at The Pennsylvania State University cooperative agreement PHY 01-14375, L.S. Finn P.I. and PHY-0245649, B.J. Owen P.I..