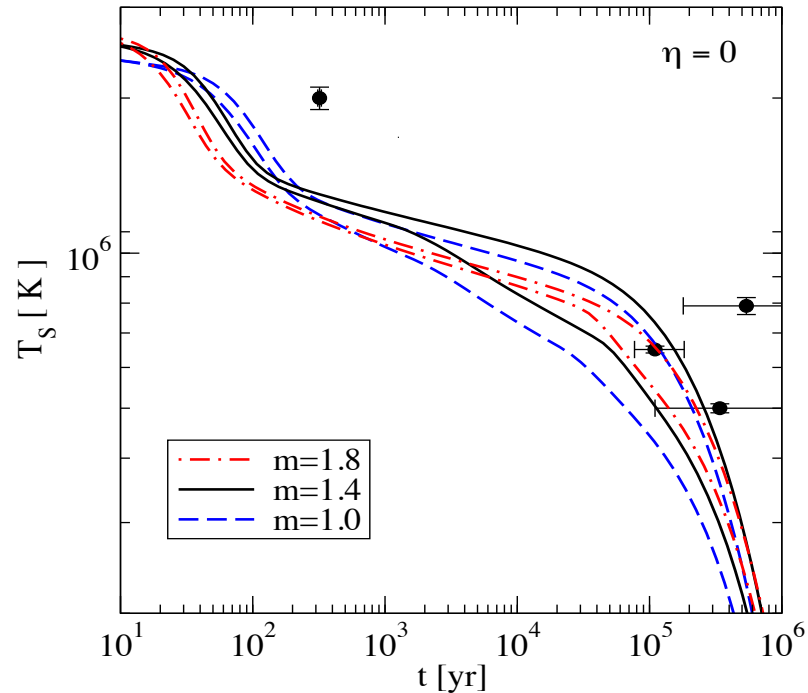


# Measuring Neutron Star Cooling to Constrain Axion Models



Neutron stars surface temperature cools through axion photon coupling. The idea is to follow-up X-ray observations of neutron stars (kilonovae) detected with LSST to constrain axion parameters space. Observations with timing and polarization observations with NICER, Strobe-X, and IXPE will provide surface temperature and characteristic age of the neutron star system.

FIG. 4: Cooling tracks of neutron star models with masses  $m = 1$  (dashed) 1.4 (solid), and 1.8 (dash-dotted) for the case of a nonaccreted iron envelope ( $\eta = 0$ ). The measured temperatures of PSR B0656+14, Geminga are consistent with neutrino cooling tracks; the uncertainty in the spin-down age of PSR B1055-52 and internal heating may account for marginal inconsistency. The axion cooling tracks are shown for  $f_{a\gamma} = 10$ .

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