Conference: Meeting of the National Research Group on Gravitational Waves

ID de Contribution: **44** Type: **ÉTOILES A NEUTRONS, SUPERNOVÆ ET SYNTHÈSES DES ÉLÉMENTS LOURDS**

GW190814: On the properties of the secondary component of the binary

mardi 30 mars 2021 15:30 (15 minutes)

We show that the odds of the mass-gap (secondary) object in GW190814 being a neutron star (NS) improve if one allows for a stiff high-density equation of state (EoS) or a large spin. Since its mass is $\in (2.50, 2.67) M_\odot$, establishing its true nature will make it either the heaviest NS or the lightest black hole (BH), and can have far-reaching implications on NS EoS and compact object formation channels. When limiting oneself to the NS hypothesis, we deduce the secondary's properties by using a Bayesian framework with a hybrid EoS formulation that employs a parabolic expansion-based nuclear empirical parameterization around the nuclear saturation density augmented by a generic 3-segment piecewise polytrope (PP) model at higher densities and combining a variety of astrophysical observations. For the slow-rotation scenario, GW190814 implies a very stiff EoS and a stringent constraint on the EoS specially in the high-density region. On the other hand assuming the secondary object is a rapidly rotating NS, we constrain its rotational frequency to be $f = 1170^{+389}_{-495}$ Hz, within a 90% confidence interval. In this scenario, the secondary object in GW190814 would qualify as the fastest rotating NS ever observed. However, for this scenario to be viable, rotational instabilities would have to be suppressed both during formation and the subsequent evolution until merger, otherwise the secondary of GW190814 is more likely to be a BH.

Auteur principal: M. BISWAS, BHASKAR (IUCAA, Pune)

Orateur: M. BISWAS, BHASKAR (IUCAA, Pune)

Classification de Session: Contributed talks: Neutron stars, supernovae and heavy elements