Contribution ID: **16** Type: **Talk**

Different ways to estimate graviton mass

Thursday 6 July 2017 17:00 (30 minutes)

In February 2016 the LIGO \& VIRGO collaboration reported the discovery of gravitational waves in merging black holes, therefore, the team confirmed GR predictions about an existence of black holes and gravitational waves in the strong gravitational field limit. Moreover, in their papers the joint LIGO \& VIRGO team presented an upper limit on graviton mass such as $m_g < 1.2 \times 10^{-22}$~eV (Abbott et al. 2016) analyzing gravitational wave signal as it was suggested by C. Will (1998). So, the authors concluded that their observational data do not show any violation of classical general relativity. We show that an analysis of bright star trajectories could constrain graviton mass with a comparable accuracy with accuracy reached with gravitational wave interferometers and the estimate is consistent with the one obtained by the LIGO \& VIRGO collaboration. This analysis gives an opportunity to treat observations of bright stars near the Galactic Center as a useful tool to obtain constraints on the fundamental gravity law such as modifications of the Newton gravity law in a weak field approximation. In that way, based on a potential reconstruction at the Galactic Center we obtain bounds on a graviton mass.

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Session Classification: Evening session