



Contribution ID : 687

Type : Oral talk

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Tuesday, 6 October 2020 19:05 (20)

Tidal forces near a black hole with scalar hairy

E.L. Andre, I.M. Potashov, Ju.V. Tchamarina, and A.N. Tsirulev

Faculty of Mathematics, Tver State University, 35 Sadovyi, Tver, Russia, 170002

We deal with static, asymptotically flat, spherically symmetric black holes supported by a minimally coupled scalar field with an arbitrary self-interaction potential. We consider a scalar black hole as a simple model of supermassive black holes in the centers of galaxies surrounded by dark matter. Both the radius of the innermost stable circular orbit and the event horizon radius of such an object are less than those of a Schwarzschild black hole with the same mass. Moreover, they can be arbitrary small, so that tidal forces, acting on a star orbiting a scalar field black hole near its horizon, can be sufficiently large to disrupt the star. This means, in turn, that tidal effects can play an important role for the interpretation of observations in galactic astrophysics.

Primary author(s) : ANDRE, Eduardo (Tver State University); POTASHOV, Ivan (Tver State University); TCHEMARINA, Julia (Tver State University); TSIRULEV, Alexander (Faculty of Mathematics, Tver State University)

Presenter(s) : TSIRULEV, Alexander (Faculty of Mathematics, Tver State University)

Session Classification : Gravitation and Cosmology

Track Classification : Gravitation and cosmology