Contribution ID: **379** Type: **Talk in the parallel session**

Infinitely degenerate exact Ricci-flat solutions in $f(R)$ gravity

Tuesday, 6 July 2021 11:35 (15 minutes)

The evidence is mounting that the Universe is currently undergoing a phase of accelerated expansion. One possible alternative is the modification in gravity in the largest possible scales. This leads to the many questions related to black-holes: violation of Birkhoff theorem and no-hair theorem. To confirm/infirm, we need to obtain exact black-hole solutions in these modified gravity theories.

In this talk, we focus on the exact spherically symmetric solutions in $f(R)$ theories of gravity. We explicitly show that some $f(R)$ models contain an infinite number of exact static, Ricci-flat spherically symmetric vacuum solutions and, hence, violate Birkhoff's theorem in $f(R)$ theories. We analytically derive two exact vacuum black-hole solutions for the same class of $f(R)$ theories. The two black-hole solutions have the event-horizon at the same point; however, their asymptotic features are different. Our results suggest that the no-hair theorem may not hold for generic modified gravity theories. We discuss the implications of our work to distinguish modified gravity theories from general relativity. (Based on arXiv:2003.05139)

Primary authors: XAVIER, Semin (IIT Bombay); Mr MATHEW, Jose (Department of Physics, The Cochin College, Kochi, Kerala, India); S. SHANKARANARAYANAN (Department of Physics, Indian Institute of Technology, Mumbai, Maharashtra 400076)

Presenter: XAVIER, Semin (IIT Bombay)

Session Classification: Black Holes in Alternative Theories of Gravity

Track Classification: Black Holes: Theory and Observations/Experiments: Black Holes in alternative theories of gravity