IOA Colloquium

Superradiance for Alfvén waves and Blandford-Znajek mechanism

Date 14:00 - 15:30, September 23 (Friday), 2022

Place 1130, Building 9 (Zoom ID: 881 5903 1592)

Speaker

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Abstract

The mechanism for extracting the rotational energy from a black hole has been discussed as an energy source for high-energy astronomical phenomena: relativistic jets in active galactic nuclei, compact objects, and gamma- ray bursts. The Blandford-Znajek process is one of the most promising candidates to describe this mechanism, which is driven by rotating black hole magnetosphere. Although the original Blandford-Znajek process is discussed for stationary magnetosphere, in realistic situations there must be wave propagation as well and some parts of the rotational energy should be transported by those waves for example via superradiance (scattering with amplification). In this talk, as a candidate of such waves, we consider an Alfvén wave in a black hole magnetosphere whose propagation stems from the magnetic tension. As a result, we show the condition for the superradiant scattering of Alfvén waves is exactly the same as that for the Blandford-Znajek process.

Biography

Dr. Sousuke Noda obtained his Ph. D. In 2018 from Nagoya University. During 2018/4-2019/9, he worked in Yukawa Institute for Theoretical Physics (YITP) in Kyoto, and moved to Center for Gravitation and Cosmology at Yangzhou University in 2019/10. From 2021/4 to present, he works in National Institute of Technology, Miyakonojo College in Miyazaki, Japan. His main research interest is wave propagation in black hole spacetimes, and he has been working on magnetohydrodynamic wave in black hole magnetosphere, exact solution of Teukolsky equation for Kerr-de Sitter spacetime and so on.