Contribution ID: **882** Type: **Talk in the parallel session**

Linear and Circular Polarization Images near Black Holes: Imprints of Magnetic Fields Structure

Monday 5 July 2021 17:40 (20 minutes)

The first imaging of the super massive black hole in M87 by the Event Horizon Telescope (EHT) has marked the beginning of a new era in black hole research that explores the properties through direct image observations. In particular, polarimetric images of the vicinity of black holes have attracted much attention because they reflect the magnetic field structure, which plays a key role in the formation of the jets. In this study, we calculatedd a general relativistic radiation transfer that takes into account the synchrotron emission, self-absorption, and Faraday effects for the Stokes parameters (I, Q, U, V), and predicted the polarimetric images with future EHT observations in mind.

First, we present a polarization image of M87* under the parameters consistent with the results of the black hole shadow published in 2019 April. We found that high black hole spin is favored and the linear polarization (LP) vectors undergo strong Faraday rotation. Furthermore, we suggest that the circular polarization (CP) components can be significantly detected in ring shape, due to the Faraday "conversion" from the LP components by the ordered magnetic field structure.

Secondly, for another target of EHT, Sgr A*, we predicted the polarimetric images using models with high disk temperature. The images obtained were found to be ring-shaped when the accretion disk was viewed from nearly face-on observer, and three-forked when it was viewed from nearly edge-on. As for the polarization components, we proposed a scenario in which the LP and CP components complementarily provide information on the magnetic fields configuration and plasma properties.

Author: TSUNETOE, Yuh (Kyoto University)

Co-authors: Prof. MINESHIGE, Shin (Kyoto University); Prof. OHSUGA, Ken (the University of Tsukuba); Dr KAWASHIMA, Tomohisa (the University of Tokyo); Dr AKIYAMA, Kazunori (Massachusetts Institute of Technology)

Presenter: TSUNETOE, Yuh (Kyoto University)

Session Classification: Radio Astronomy from Space

Track Classification: Black Holes: Theory and Observations/Experiments: Radio Astronomy from Space