Contribution ID: **59** Type: **Contributed talk in mini symposium**

Investigation into the excess infrared emission detected from the west hot spot of the radio galaxy Pictor A: a possible evidence of the turbulence acceleration.

Friday, 15 December 2023 11:27 (12 minutes)

From the west hot spot of the radio galaxy Pictor A, excess infrared emission above the radio-to-optical synchrotron emission was detected in the range of 1-100 THz range with the Herschel and WISE observatories. In order to find out the nature of the infrared excess, submillimeter photometry was performed with the Atacama Compact Array of the Atacama Large Millimeter/submillimeter Array at the frequency of 405 GHz. A submillimeter source was detected at the position of the west hot spot, while no significant emission was revealed from diffuse structures associated to the hot spot.This indicates that the excess infrared emission originates in the west hot spot itself rather then contamination from the diffuse structure. Because the derived submillimeter flux of the west hot spot, a 405 GHz flux density of 80.7 +- 3.1 mJy, agrees with the extrapolation from the synchrotron radio spectrum, the excess infrared emission is suggested to exhibit no major contribution at 405 GHz.

By ascribing the excess infrared emission to the substructures resolved with the Very Long Baseline Array within the hot spot, the spectrum of the excess was simply modeled with a broken power-law model subjected to a high-frequency cut off, which is widely adopted for studies of particle acceleration under a continuous energy injection condition. The low-frequency spectral index of the excess emission (alpha = 0.06 +- 0.35) is found to be exceptionally harder than the prediction from the diffusive shock acceleration (alpha > 0.5). As a result, an attractive scenario is proposed that the excess infrared emission is generated through the post-shock turbulence acceleration (so-called the Fermi-II acceleration) operated in the substructures.

Primary author: ISOBE, Naoki (ISAS/JAXA)

Co-authors: Dr NAGAI, Hiroshi (National Astronomical Observatory of Japan); Dr TASHIRO, Makoto (Department of Physics, Saitama University); Dr KINO, Motoki (Kogakuin University of Technology & Engineering, Academic Support Center); Dr BABA, Shunsuke (Graduate School of Science and Engineering, Kagoshima University); Dr NAKAGAWA, Takao (ISAS/JAXA); Dr SUNADA, Yuji (Department of Physics, Saitama University)

Presenter: ISOBE, Naoki (ISAS/JAXA)

Session Classification: Accretion Processes