A study of iron and dust in the supernova remnant IC443

Takuma Kokusho[1], Takahiro Nagayama[2], Hidehiro Kaneda[1], Daisuke Ishihara[1], Ho-Gyu Lee[3], and Takashi Onaka[4]

[1]Nagoya University, Japan, [2]Kagoshima University, Japan, [3]Korea Astronomy and Space Science Institute, Republic of Korea, [4]University of Tokyo, Japan

IC443 is a Galactic supernova remnant (SNR) , where shocks strongly interact with the surrounding interstellar medium. In general, the gas components of the elements that are depleted onto dust grains are not able to be detected in their line emission. In SNR shock regions, however, they are released to the interstellar space through dust destruction by shocks, and can be observed with their line emission. Therefore IC443 is an excellent laboratory to study chemical compositions of dust.

We observed IC443 with the IRSF/SIRIUS, a near-infrared camera on the 1.4-m telescope, using the narrow-band filters tuned for the [Fe II] 1.257 and 1.644 μm, Paβ, and H_2 1-0 S(1) lines. As a result, we find that the [Fe II] and Paβ line emissions show filamentary structures all over the observed region (30' x 35'). In contrast, the H_2 line emission is detected mainly in the southern region. We also derived the distributions of dust and highly-ionized iron in IC443 with AKARI and Suzaku, respectively. We reveal that the dust in IC443 is distributed in shell-like structures, while the highly-ionized iron concentrates in the central region.

Using the above results, we investigate the chemical composition of dust, focusing on the distribution of iron in shocked regions. We compare our observational results with model calculations to verify our hypothesis.