

**Q09a ATCA Study of Small Magellanic Cloud Supernova Remnant 1E 0102.2–7219**

Rami Alsaberi (Gifu Uni), Miroslav Filipovic (WSU Uni), Shi Dai (CSIRO), Hidetoshi Sano (Gifu Uni), Roland Kothes (DRAO), Jeffery Payne (WSU Uni), et al.

We present new and archival Australia Telescope Compact Array and Atacama Large Millimeter/submillimeter Array data of the Small Magellanic Cloud supernova remnant 1E 0102.2–7219 at 2100, 5500, 9000, and 108000 MHz; as well as HI data provided by the Australian Square Kilometre Array Pathfinder. The remnant shows a ring-like morphology with a mean radius of 6.2 pc. The 5500 MHz image reveals a bridge-like structure, seen for the first time in a radio image. This structure is also visible in both optical and X-ray images. In the 9000 MHz image we detect a central feature that has a flux density of 4.3 mJy but rule out a pulsar wind nebula origin, due to the lack of significant polarisation towards the central feature with an upper limit of 4 per cent. The mean fractional polarisation for 1E 0102.2–7219 is  $7 \pm 1$  and  $12 \pm 2$  per cent for 5500 and 9000 MHz, respectively. The spectral index for the entire remnant is  $-0.61 \pm 0.01$ . We estimate the line-of-sight magnetic field strength in the direction of 1E 0102.2–7219 of  $\sim 44 \mu\text{G}$  with an equipartition field of  $65 \pm 5 \mu\text{G}$ . This latter model, uses the minimum energy of the sum of the magnetic field and cosmic ray electrons only. We detect an HI cloud towards this remnant at the velocity range of  $\sim 160\text{--}180 \text{ km s}^{-1}$  and a cavity-like structure at the velocity of  $163.7\text{--}167.6 \text{ km s}^{-1}$ . We do not detect CO emission towards 1E 0102.2–7219.