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3D Ion Temperature Reconstruction HIROSHI TANABE, SETTHIVOINE YOU, ALEXANDER BALANDIN, MICHIAKI INOMOTO, YASUSHI ONO, University of Tokyo — The TS-4 experiment at the University of Tokyo collides two spheromaks to form a single high-beta compact toroid. Magnetic reconnection during the merging process heats and accelerates the plasma in toroidal and poloidal directions. The reconnection region has a complex 3D topology determined by the pitch of the spheromak magnetic fields at the merging plane. A pair of multichord passive spectroscopic diagnostics have been established to measure the ion temperature and velocity in the reconnection volume. One setup measures spectral lines across a poloidal plane, retrieving velocity and temperature from Abel inversion. The other, novel setup records spectral lines across another section of the plasma and reconstructs velocity and temperature from 3D vector and 2D scalar tomography techniques. The magnetic field linking both measurement planes is determined from in situ magnetic probe arrays. The ion temperature is then estimated within the volume between the two measurement planes and at the reconnection region. The measurement is followed over several repeatable discharges to follow the heating and acceleration process during the merging reconnection.

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