Compact Symmetric Objects: The Youngest Radio Galaxies

A. G. Polatidis
(Max-Planck Institut für Radioastronomie
Postfach 2024, D-53010 Bonn, Germany)
apolatid@oso.chalmers.se

Compact Symmetric Objects (CSOs) are powerful radio sources with symmetric radio emission around the centre of activity in the form of mini-lobes which contain hotspots and/or jets extending up to 1 kpc. Their morphology is analogous to the large kpc and Mpc-scale double radio galaxies. The hotspots can be considered as the working surface of the jet as they propagate through the ISM and not just the location of a simple shock propagating in the jet. We discuss recent measurements of proper motions of the hotspots of Compact Symmetric Objects. Source expansion has been detected in ten CSOs so far and all these objects are very young ($< 3 \times 10^3$ years). For a few sources in which ages have also been estimated from energy supply and spectral ageing arguments we show that these estimates are comparable. We also use proper motion studies to constrain hotspot accelerations, side-to-side motions and differences in hotspot advance speeds between the two hotspots within sources. Although most CSOs are young sources their evolution is unclear. It appears that many of them are the precursors of the large double radio galaxies. There is also increasing evidence that in some objects the CSO structure represents a new phase of activity within a recurrent source. We also discuss recent detections of atomic (H I) and molecular (CO and excited OH) gas in CSOs which we tentatively identify as lying in a disk or torus with a plane normal to the axis of the radio source, consistent with the hypothesis of the Unified Schemes.