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Compact AGNs at low frequencies

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Compact Active Galactic Nuclei, such as Gigahertz Peaked Spectrum (GPS) and Compact Steep Spectrum (CSS) radio sources are (a) young, and evolving into classical double radio galaxies however, in some cases their evolution may be (b) temporarily frustrated by their host environments or (c) transient on short timescales $< 10^4 - 10^5$ yr. Regardless of these hypotheses, however, GPS and CSS sources are the important signposts of relativistic jet feedback in evolving galaxies. The low frequency radio observations allow us to observe the oldest plasma in such sources and thus the reconstruction of the source's history and understanding of the dynamics of radio galaxies and their interaction with their environment from the very beginning. Here, we present the preliminary results of the LOFAR study of a sample of 90 CSS sources. We looked for halos around GPS/CSS sources as a probe of past cycles of radio activity and for the peak location and slope in the optically thick part of their synchrotron spectra using LoTSS and LoLSS measurements. In addition, we also performed an analysis of infrared observations from the WISE satellite for the entire sample, and an analysis of the evolutionary status of these sources based on the relationship of the spectral turnover frequency to the linear size.

The analysis of the radio properties and evolutionary status of these objects will be updated as the LoLSS observations proceed and supplemented with the high-resolution radio maps of some sources in near future.