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Modeling the Spectral Energy Distributions and Spectropolarimetry of Blazars

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The magnetic field strengths and topologies in blazar jets are not yet well understood. The low-frequency (radio through UV / X-rays) emission from blazars is likely dominated by non-thermal synchrotron emission from relativistic electrons in the jets and is therefore highly polarised, while in the optical through X-ray regime, unpolarised thermal radiation components, e.g., from the accretion disk, the host galaxy, or emission lines from the Broad Line Region, contribute. The accretion disk is not visible for some blazars as it is outshone by the synchrotron emission. Spectropolarimetry observations provide an indication on the frequency regime in the EM spectrum, wherein the unpolarised accretion disk dilutes the synchrotron polarisation, which is visible in a decrease in the total degree of polarisation observed. A Southern African Large Telescope target-of-opportunity, Large Science Program, provides spectropolarimetry of flaring blazars with co-ordinated multi-wavelength observations from the Las Cumbres Observatory, Swift-XRT and Fermi-LAT. A model is presented that simultaneously fits the spectral energy distributions and spectropolarimetry observations for the flat spectrum radio quasar 4C+01.02 (z = 2.1). This enabled constraining its black hole mass to 4 x 10ˆ8 M_sol and gives us a characterizing order of how tangled its magnetic field is in the emission region. Considering a leptonic model, the high energy X-ray and gamma-ray radiation can be modelled with Compton scattering of the synchrotron radiation (polarised), and external radiation fields of the broad line region and accretion disk (unpolarised). Preliminary results are presented of the high-energy (X-ray - gamma-ray) polarisation of 4C+01.02.

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