Contribution ID: **422** Type: **Poster**

An eclipsing binary black hole in MRK 421

Tuesday 15 December 2015 18:23 (3 minutes)

A model independent power spectrum light curve analysis in the optical, hard X-ray and gamma-rays of the blazar MRK 421 shows clear evidence for a periodicity of approximately 400 days. A subsequent full maximum likelihood analysis fitting an eclipse model confirms this periodicity with a consistent phase for the bands analysed. The most parsimonious physical mechanism to which this periodicity could be ascribed is a dynamical effect produced by an orbiting supermassive black hole companion of mass of about 10ˆ7 solar masses eclipsing the central black hole, which has an approximate mass of 10ˆ8 solar masses.

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Session Classification: 16 - Black holes