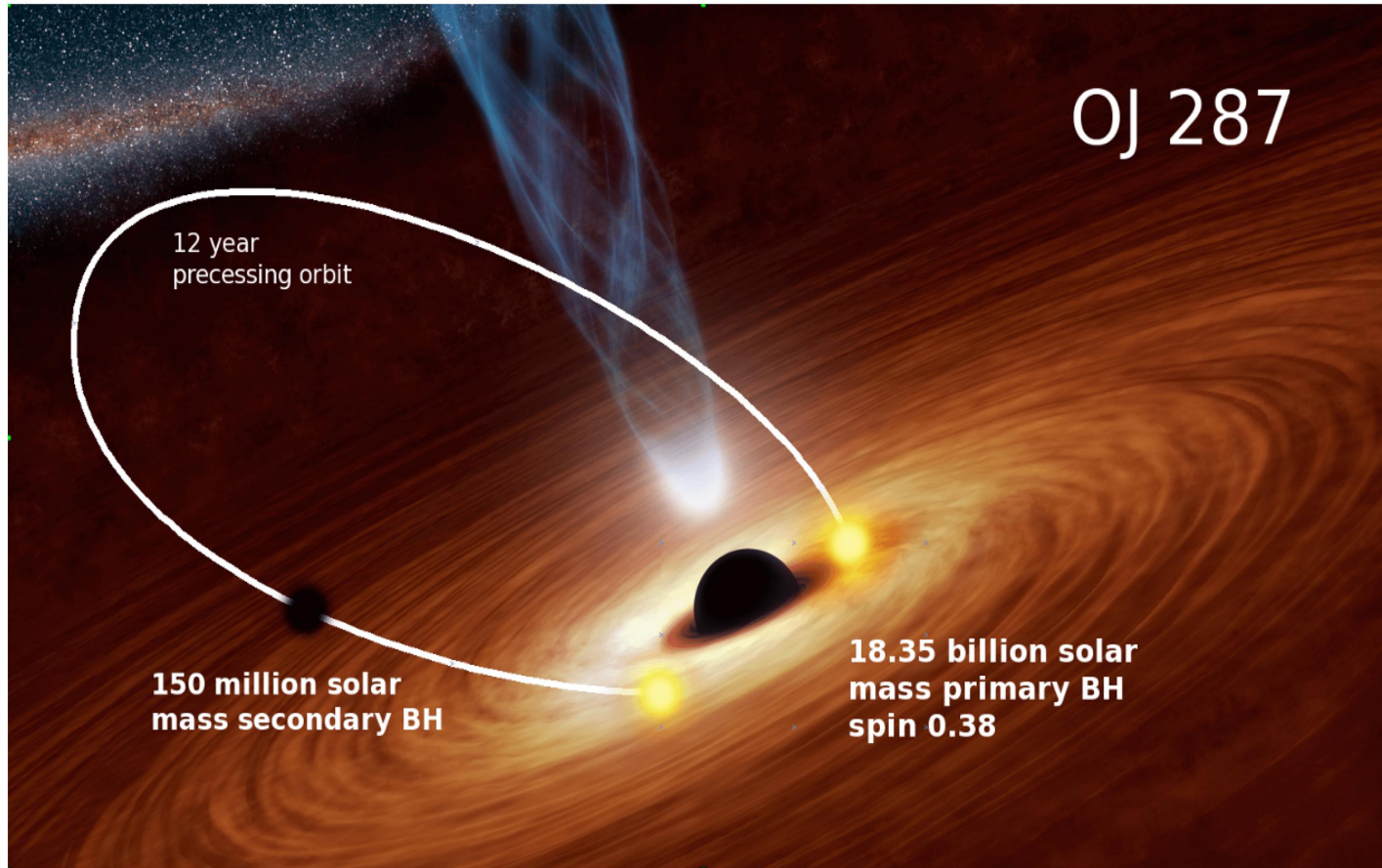
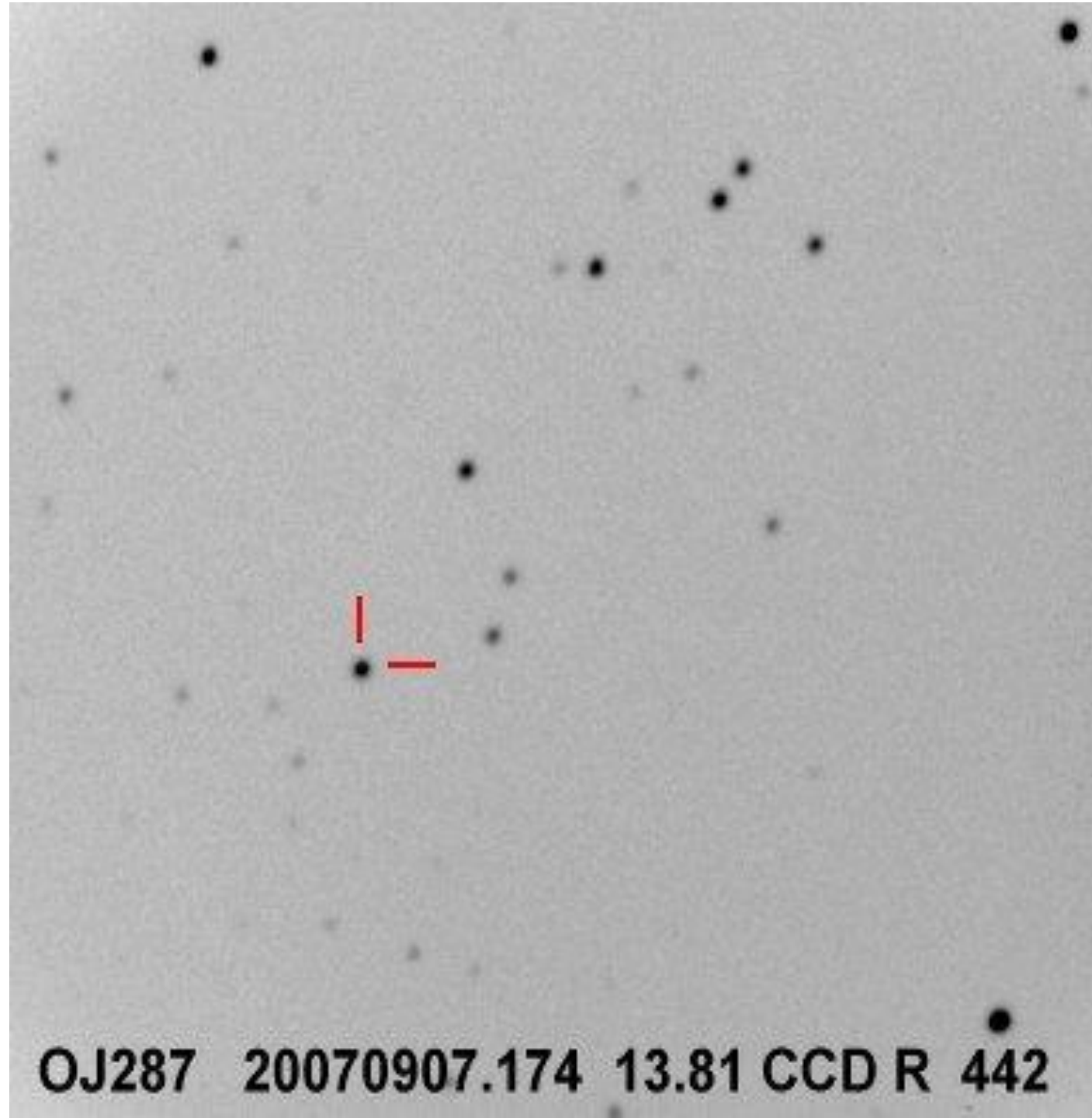


The first detection of the secondary jet in OJ287

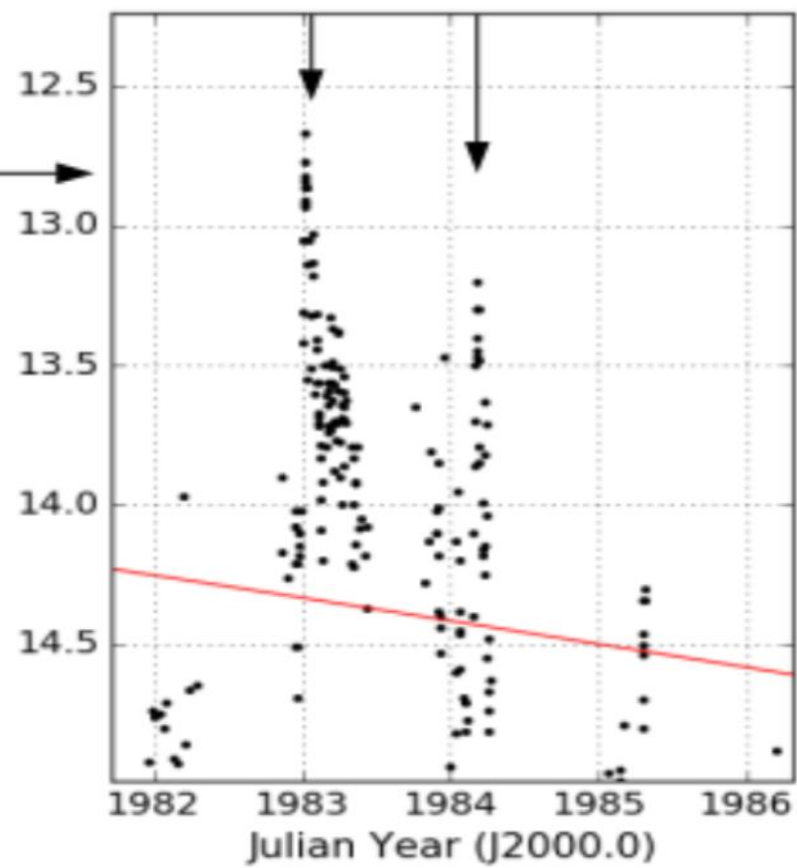
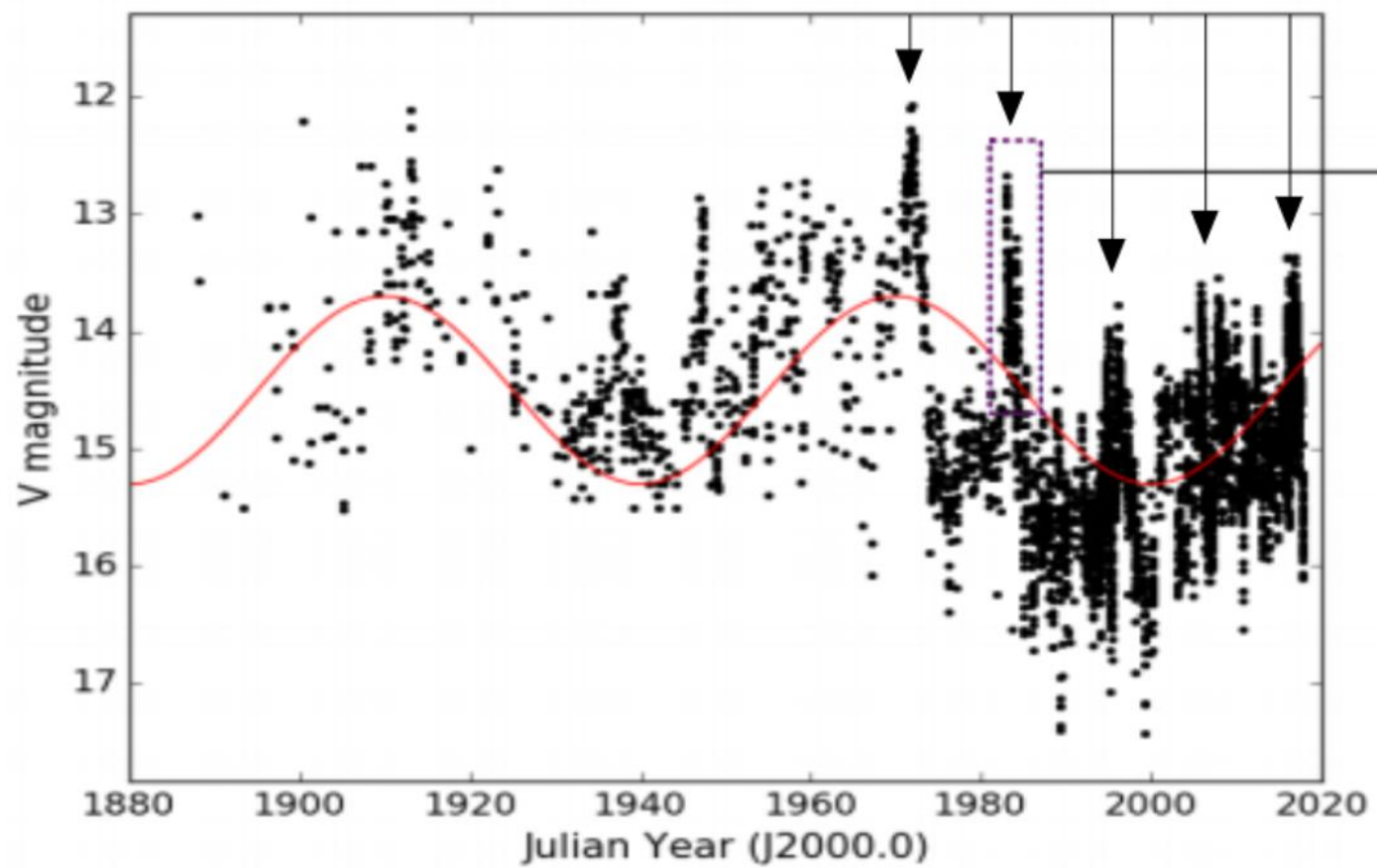
M. Valtonen, S.Zola, A. Gopakumar
Turku Cracow Mumbai

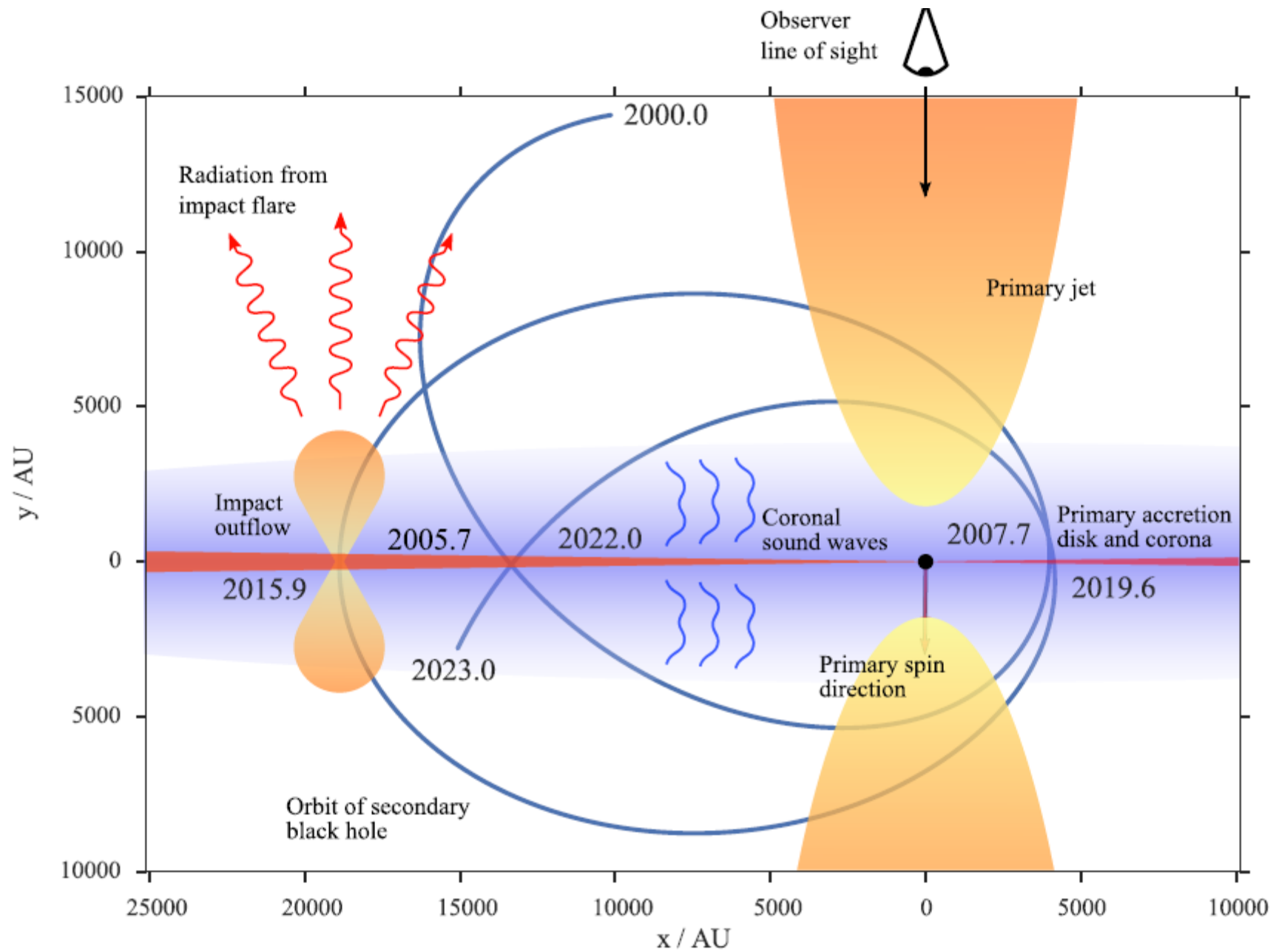
OJ287 binary black hole system



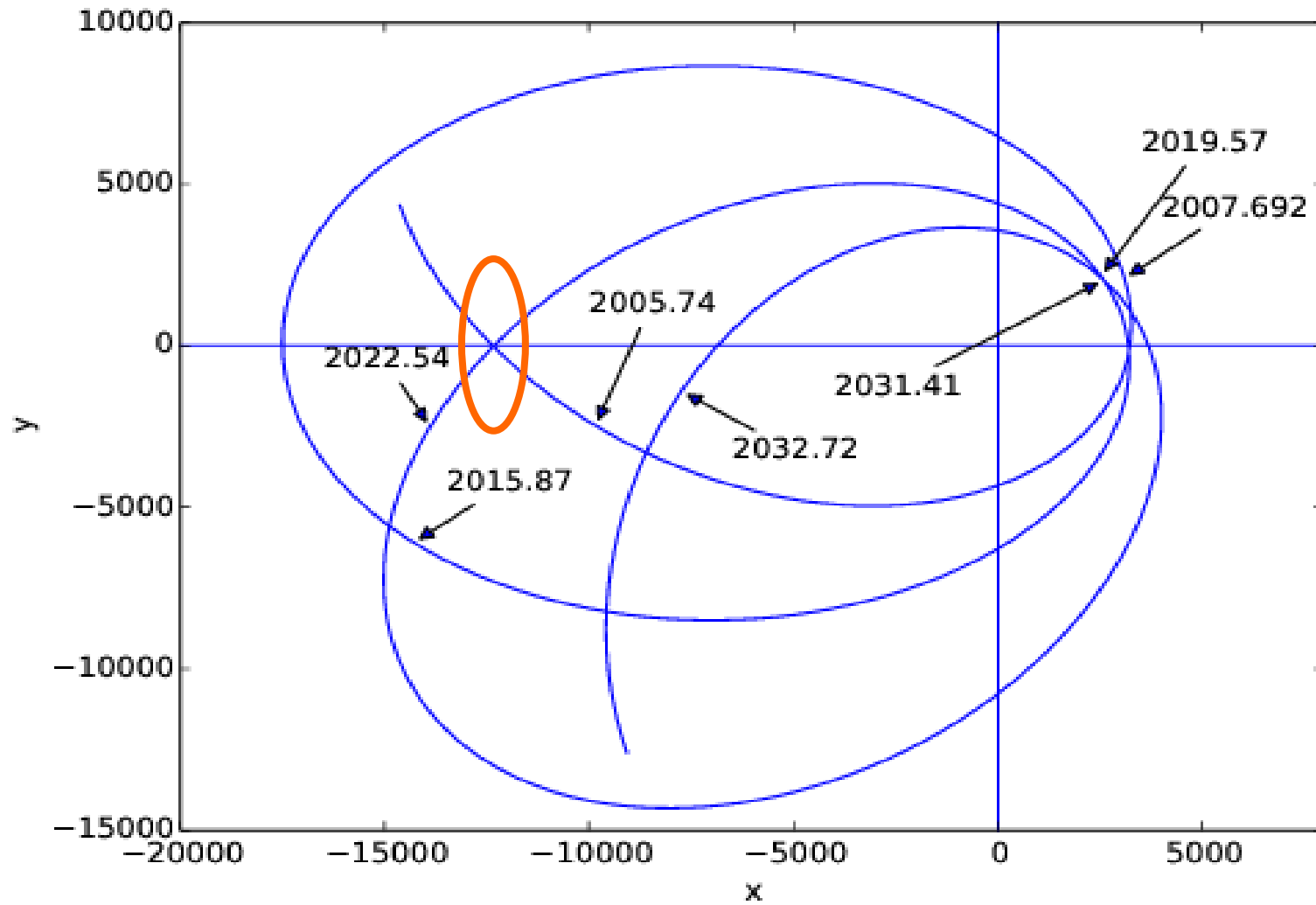


OJ287 20070907.174 13.81 CCD R 442





OJ287



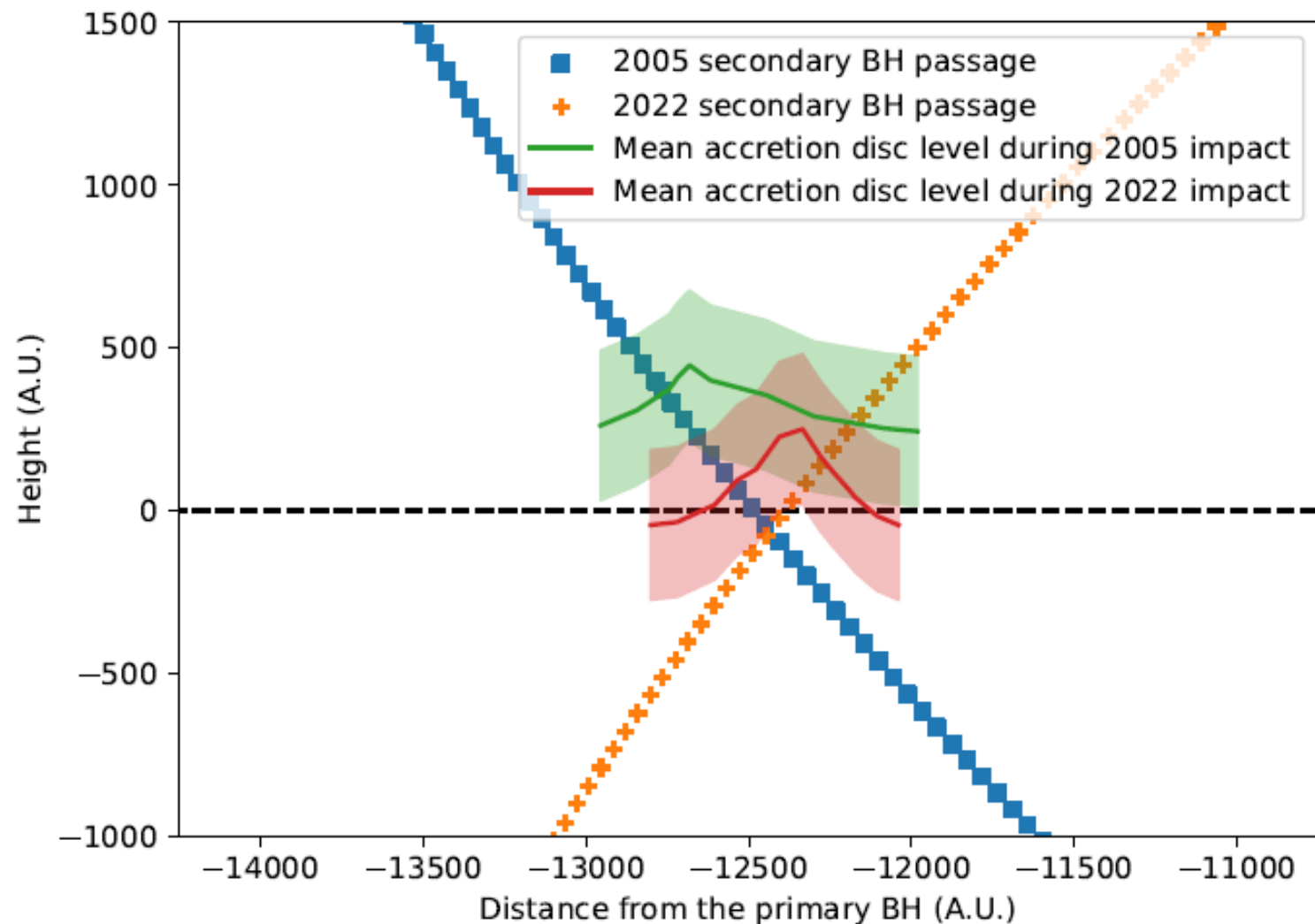
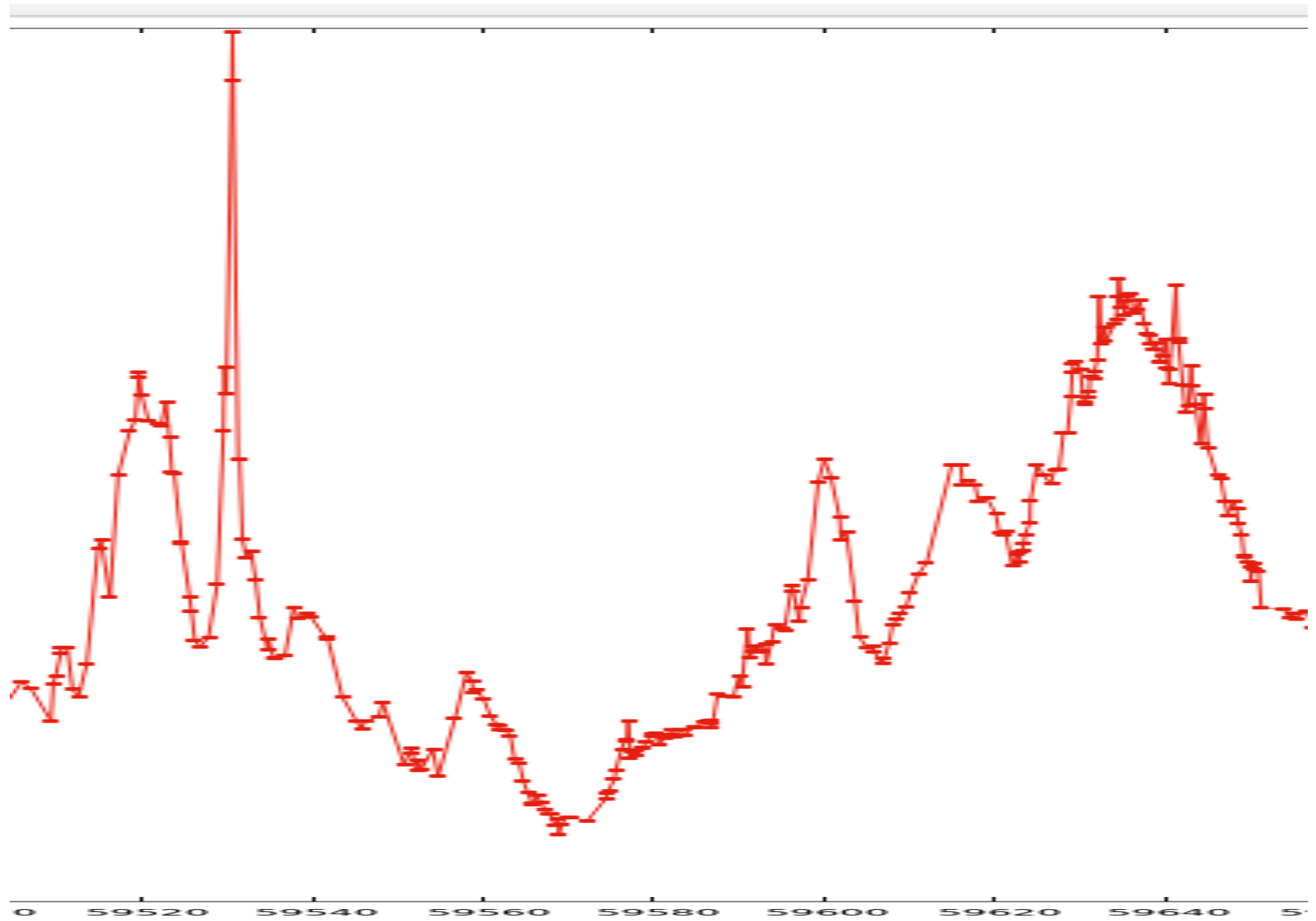


Figure 2. Accretion disc profiles around the impact sites during the 2005 and 2022 disc impact epochs. We also display the orbital path of the secondary SMBH during these times. The secondary arrives from above at both times. We see that the actual epoch of impact depends on the disc level. Prior to the present calculation, the 2005 disc level was used for the 2022 flare arrival epoch estimates, and it led to July 20, 2022 as the arrival epoch of thermal flare. From here, the pre-impact disc level is estimated at -45 ± 5 AU and the epoch of the impact flare arrival is projected within a narrow range of July 7 - July 13, 2022.

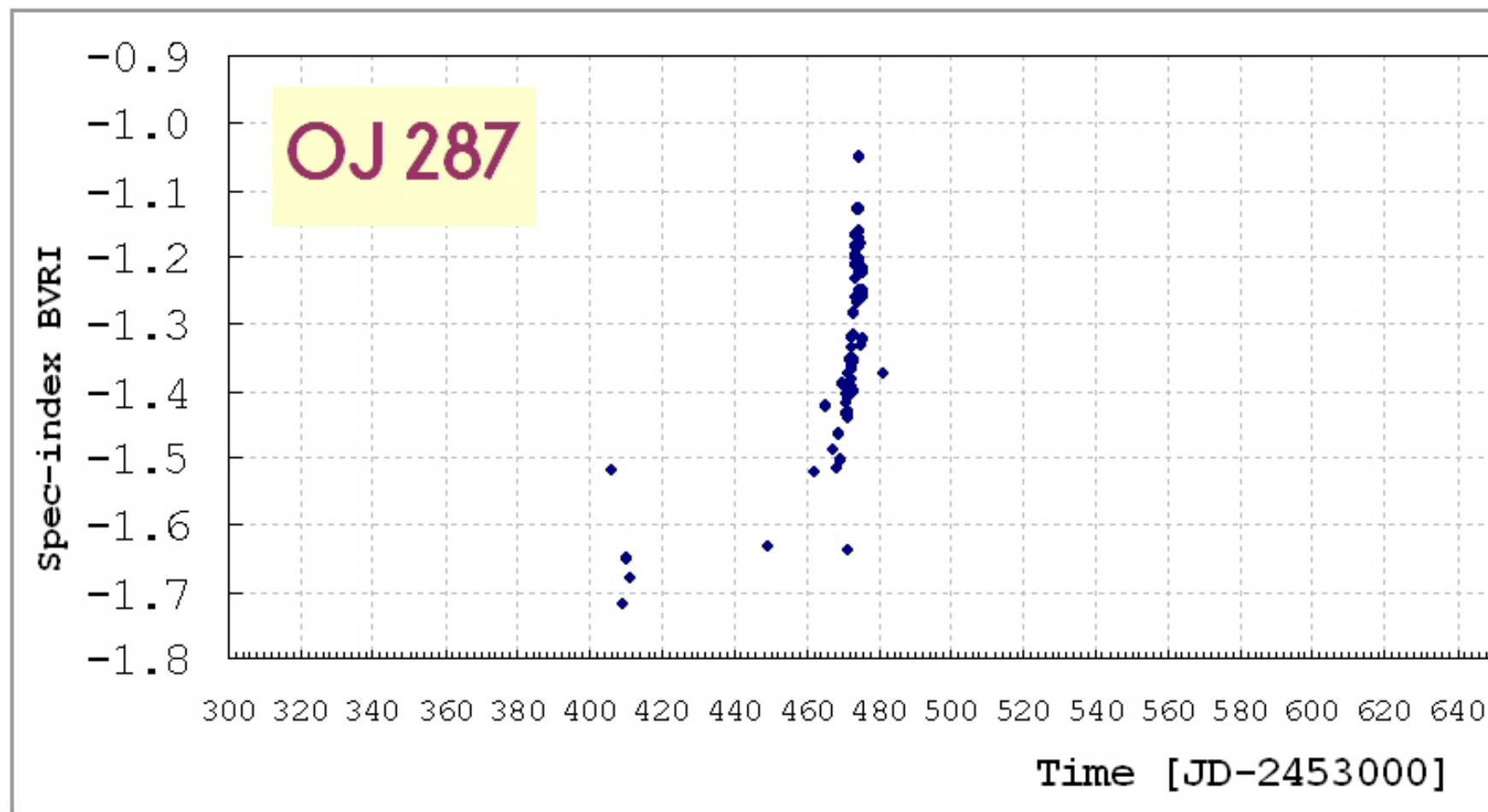
Roche

Gamma

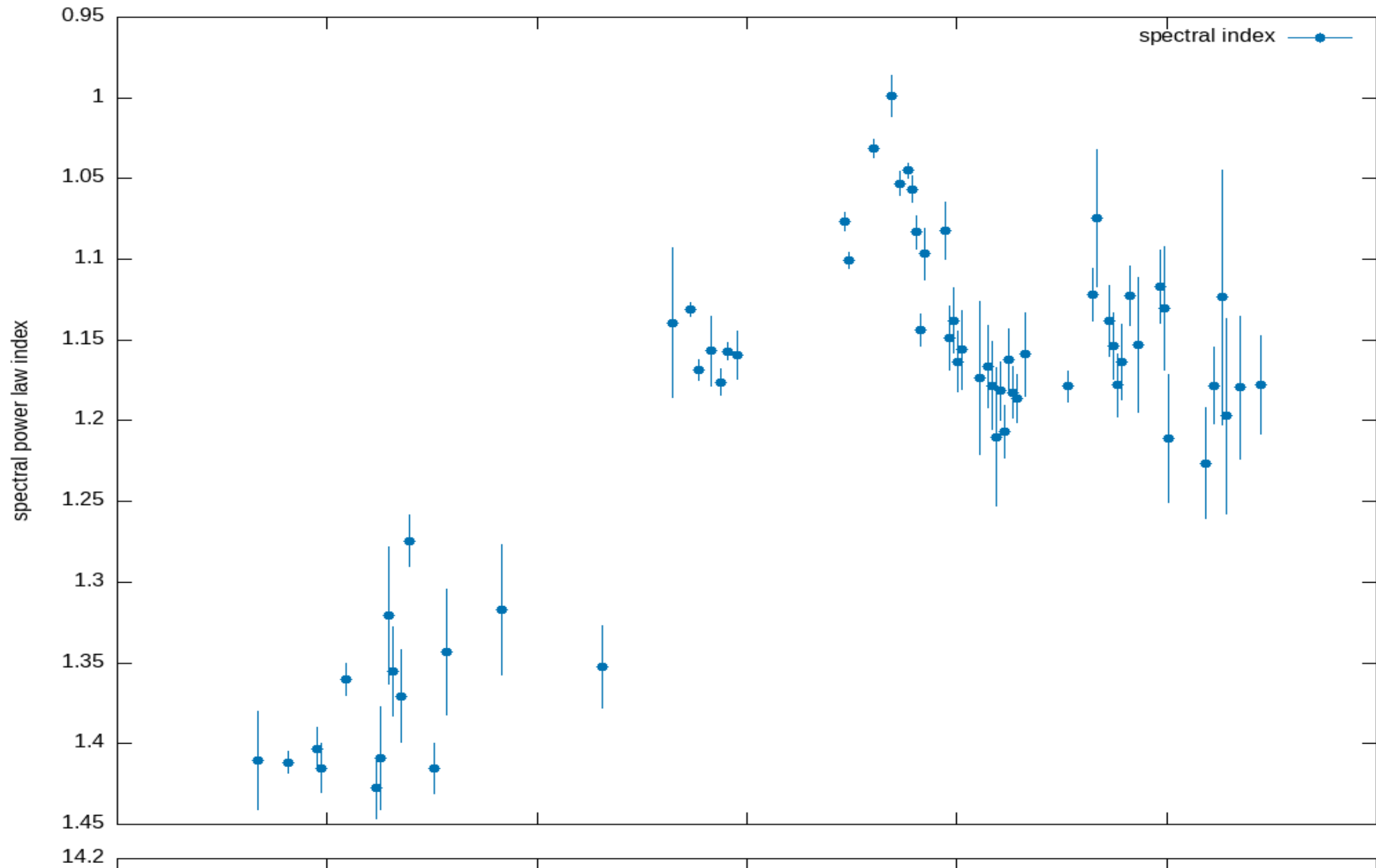
Blue



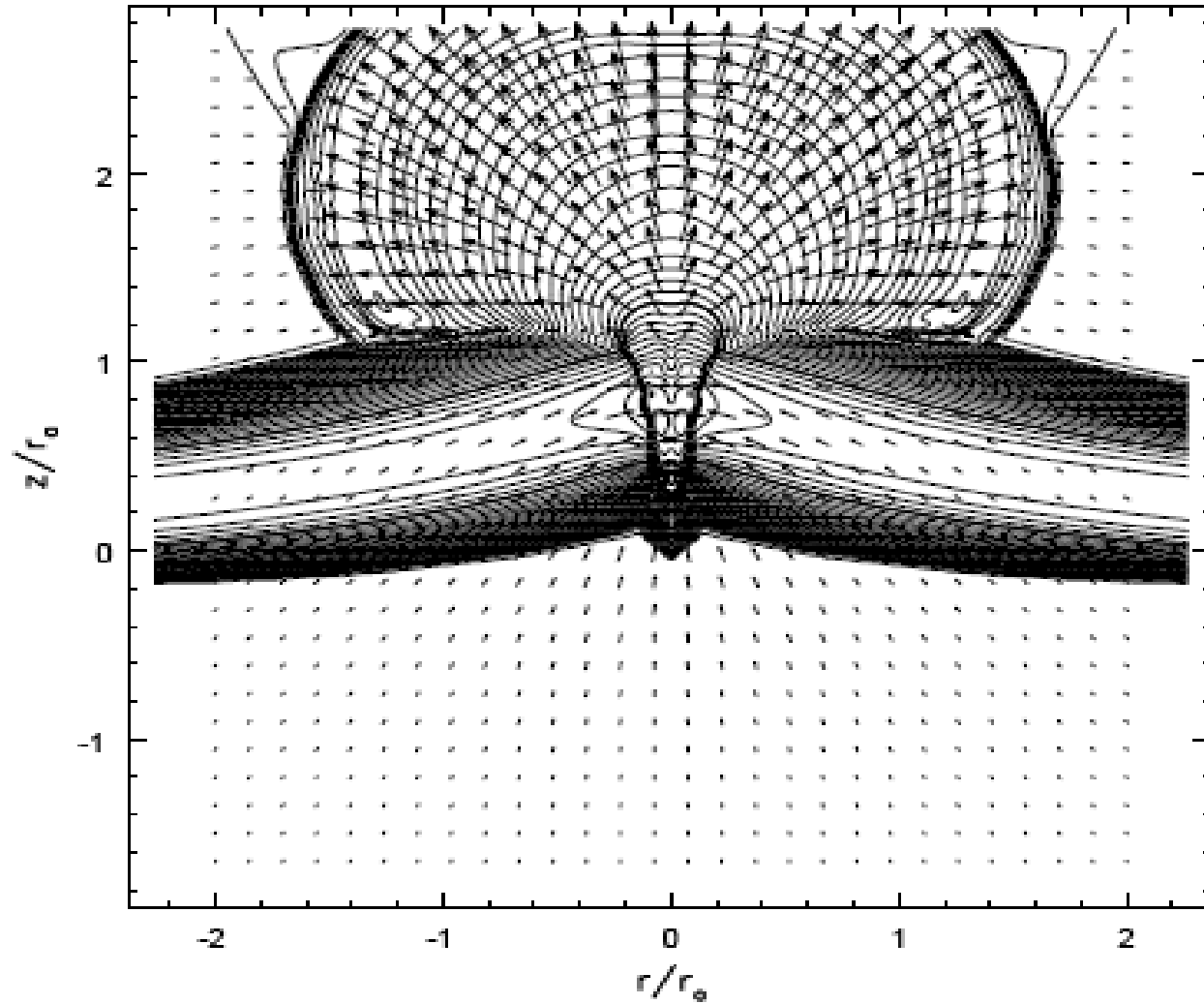
2005 pre-flare



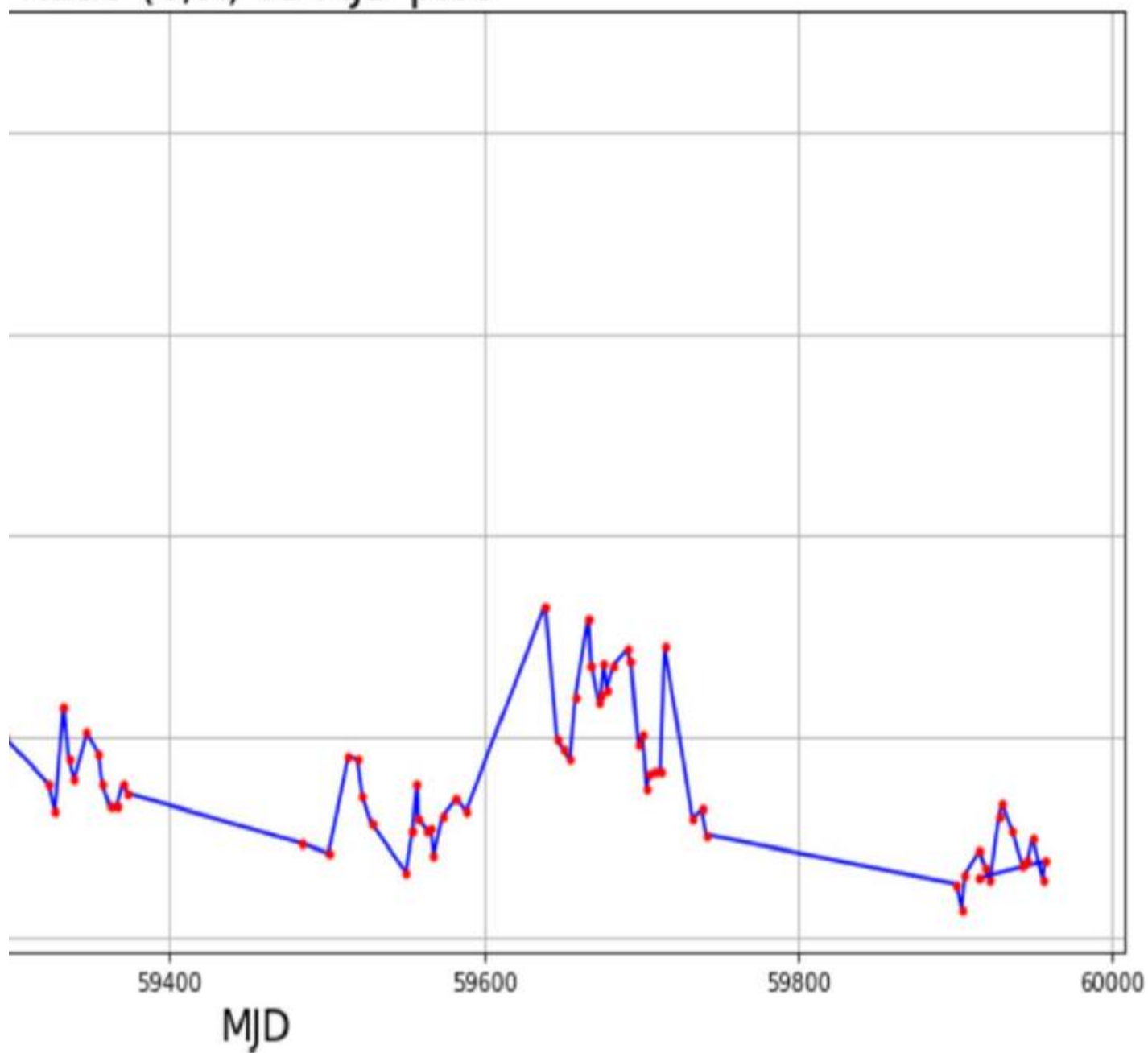
OJ 287 Color Evolution



Ivanov et al. 1998



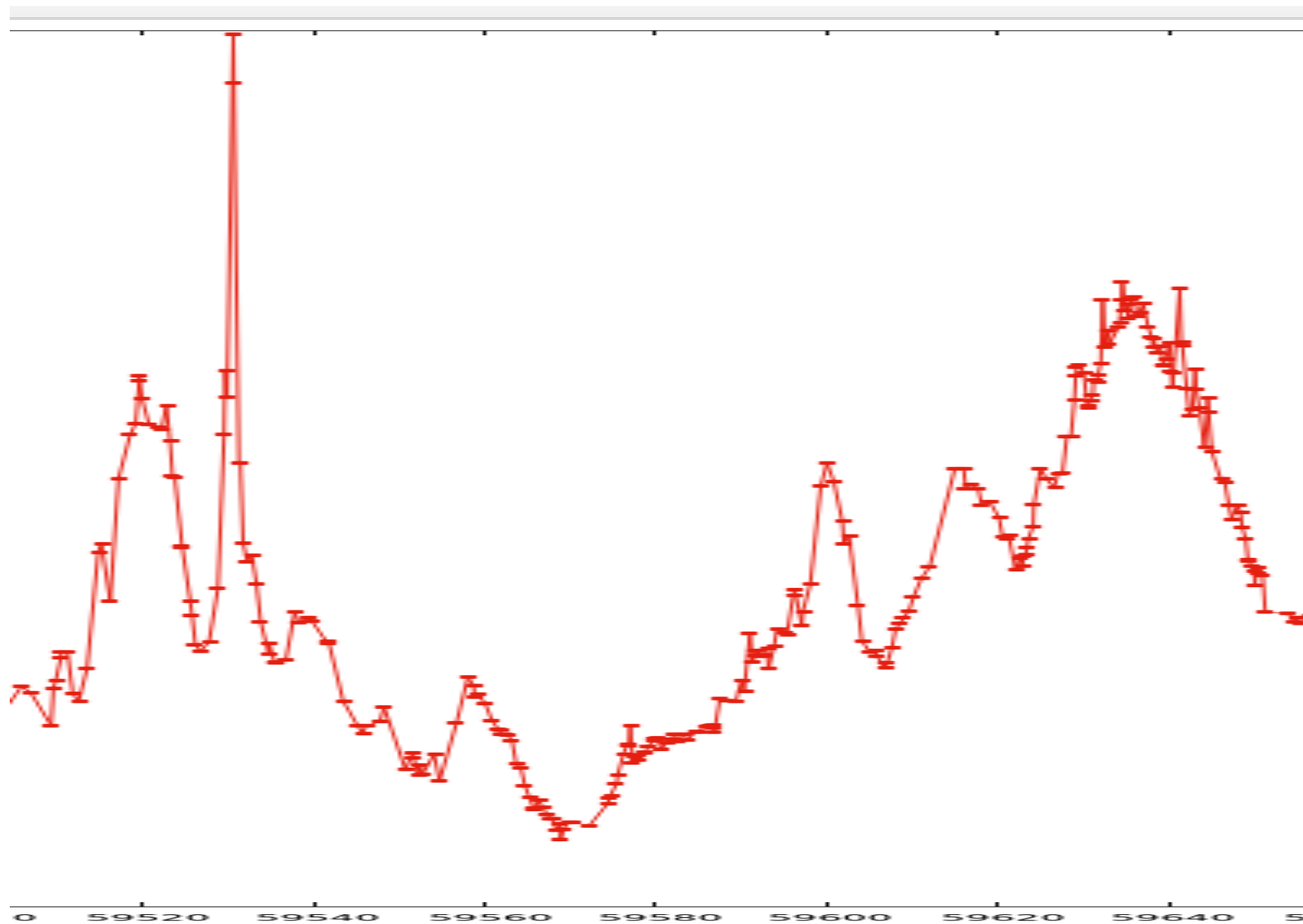
Ratio (V/X) vs MJD plot

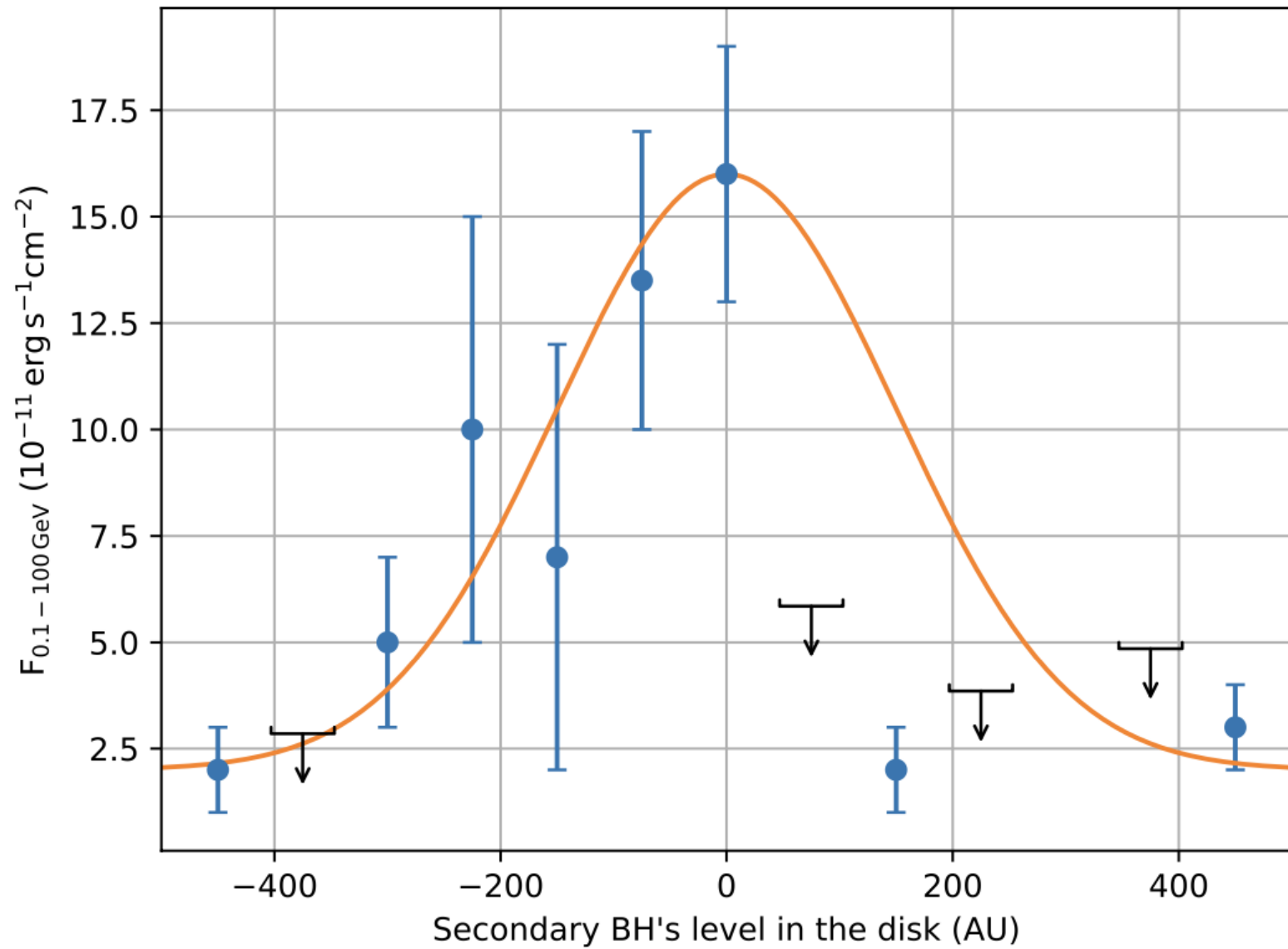


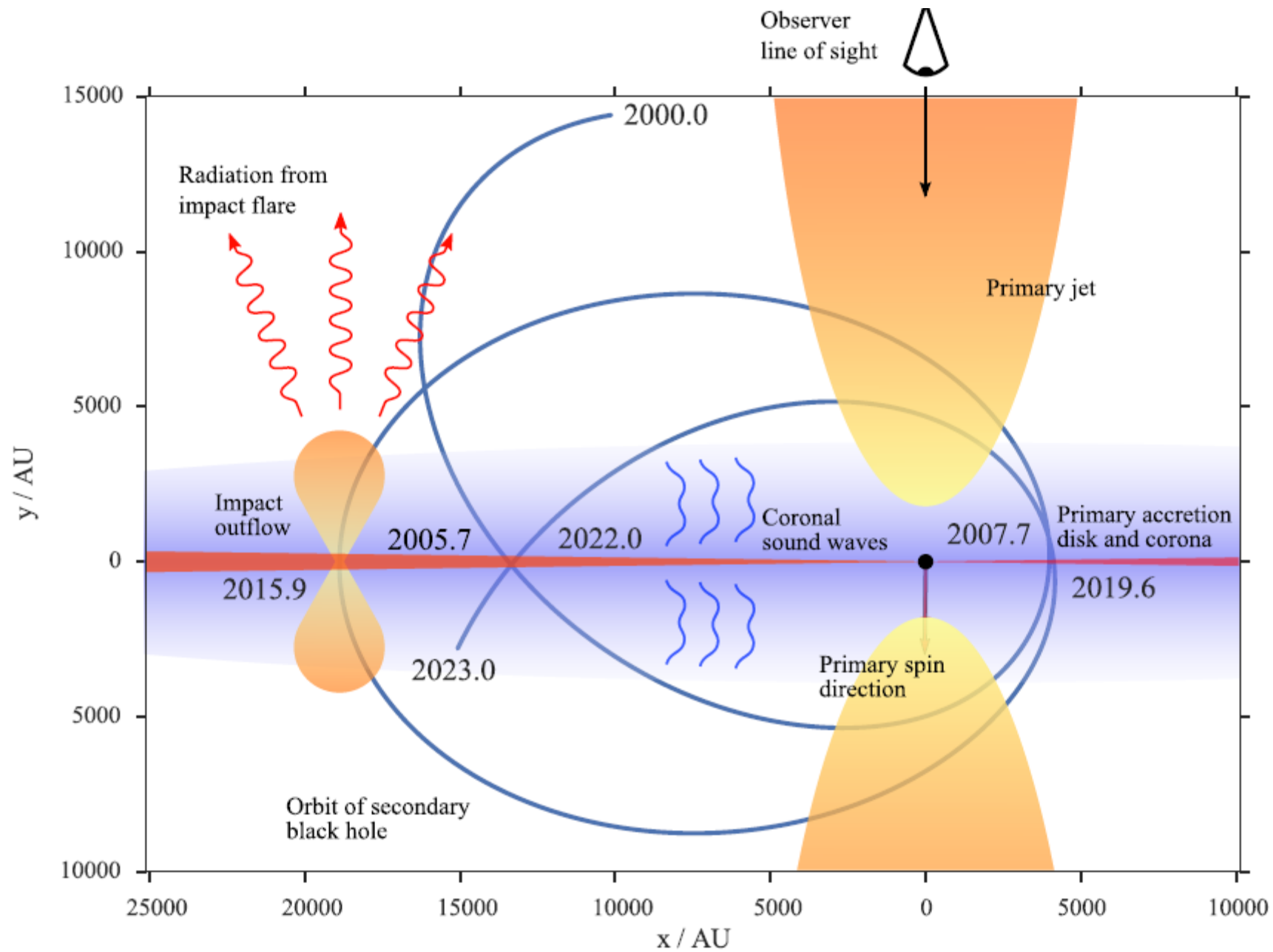
Roche

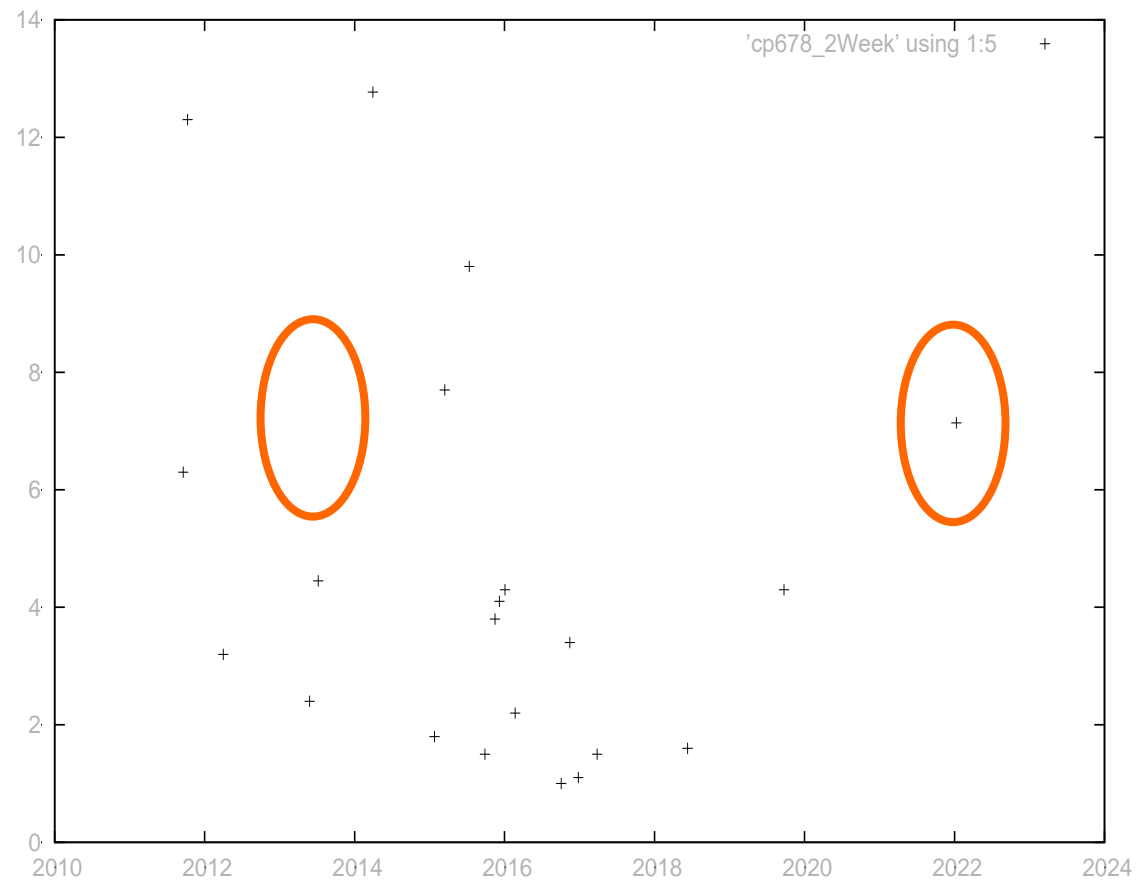
Gamma

Blue





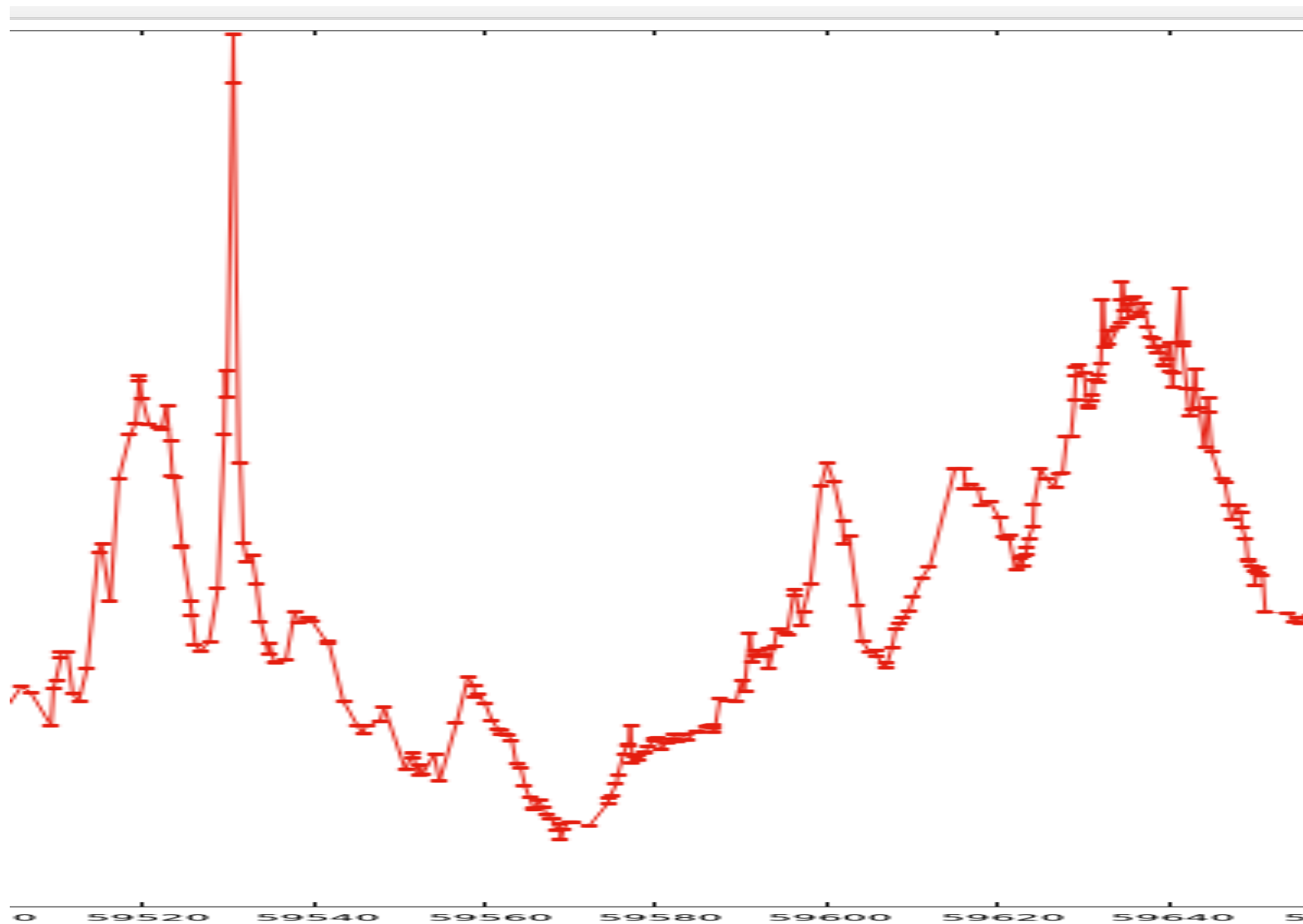


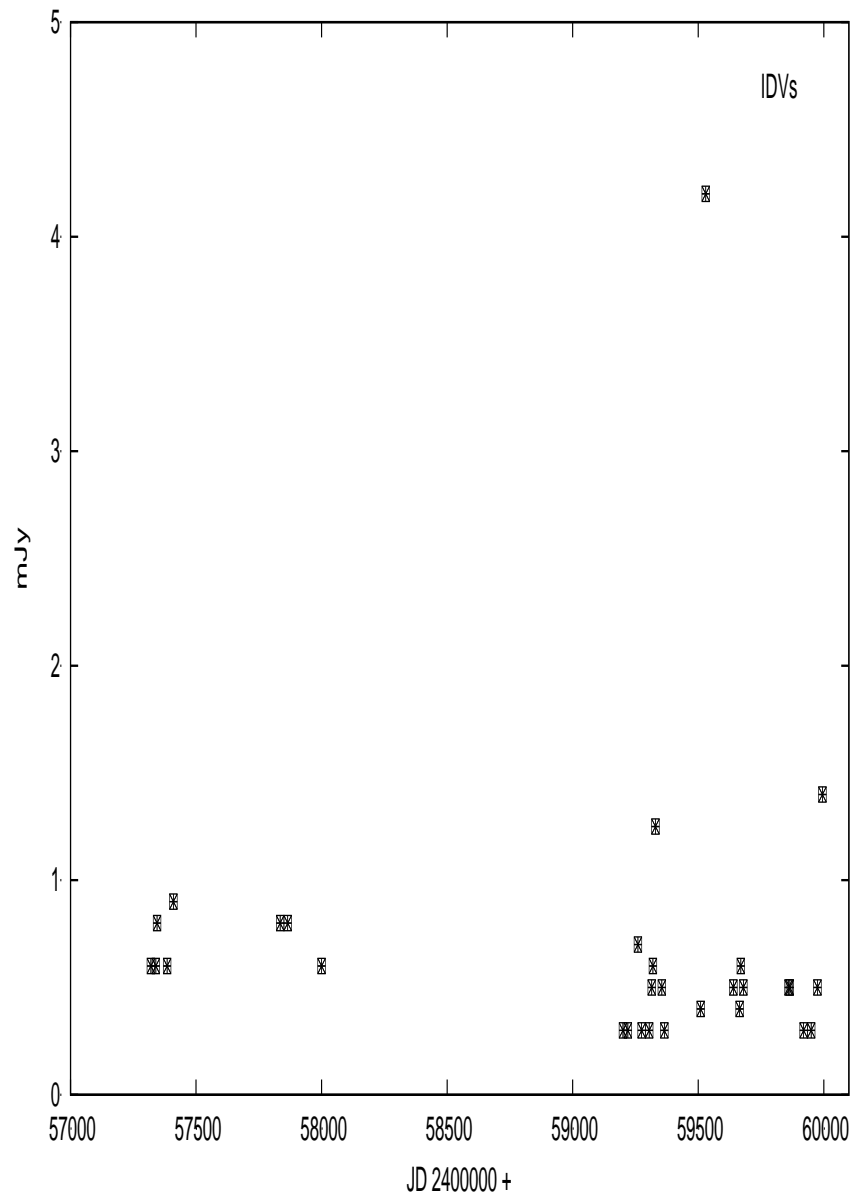


Roche

Gamma

Blue

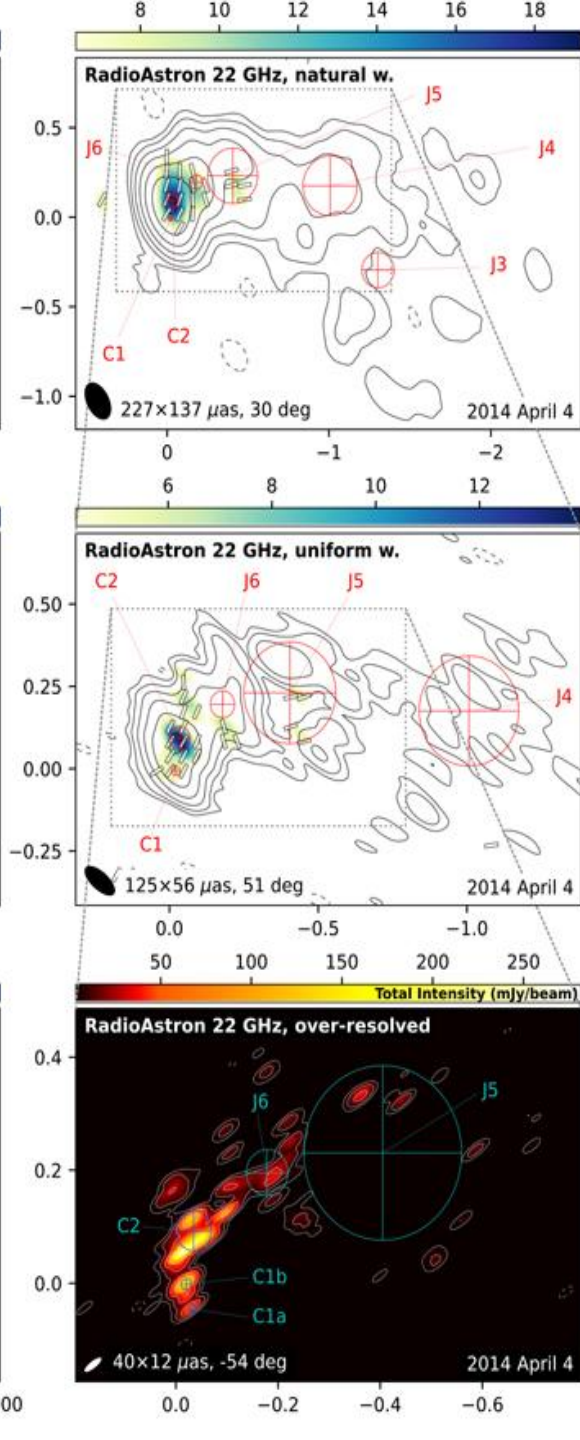
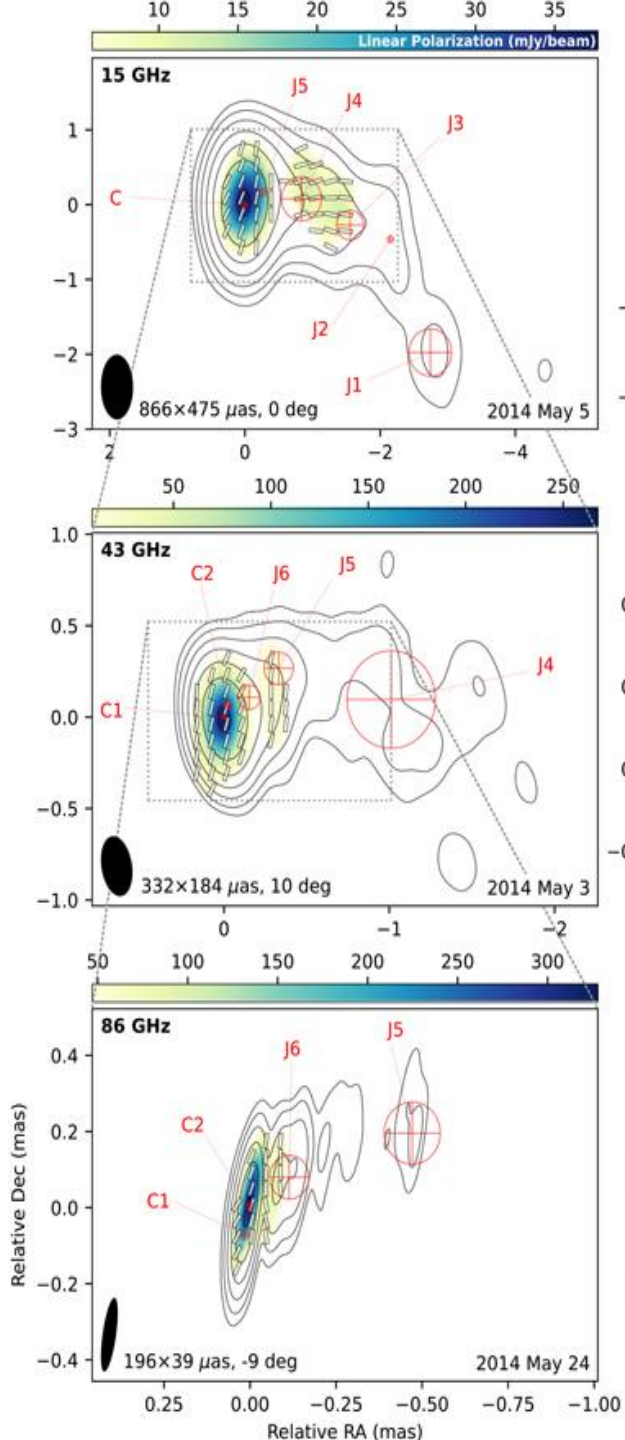
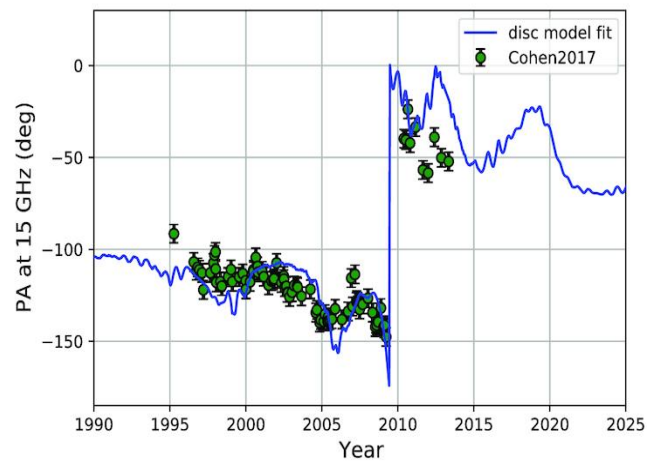
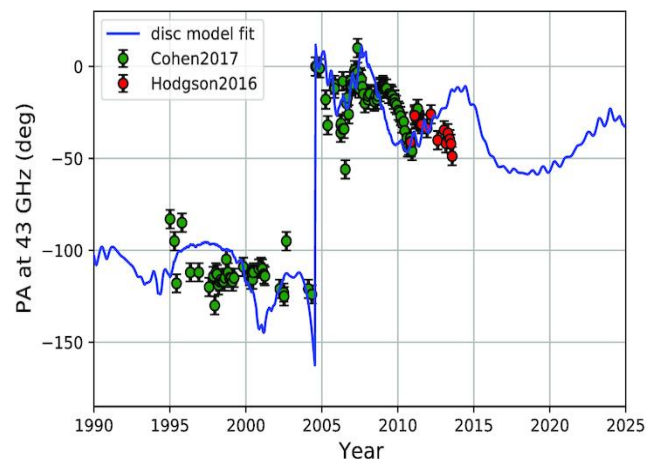
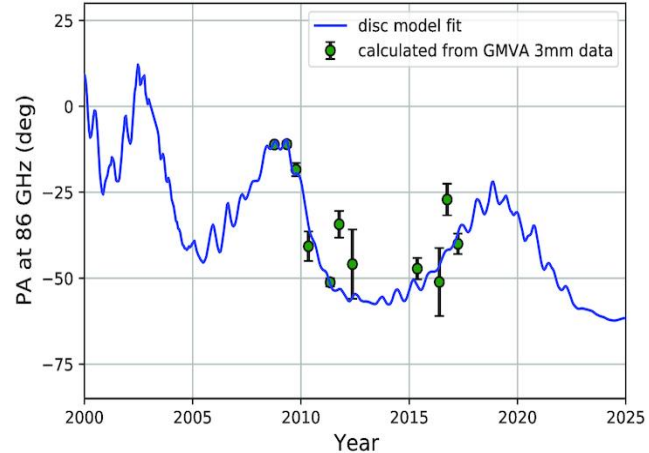


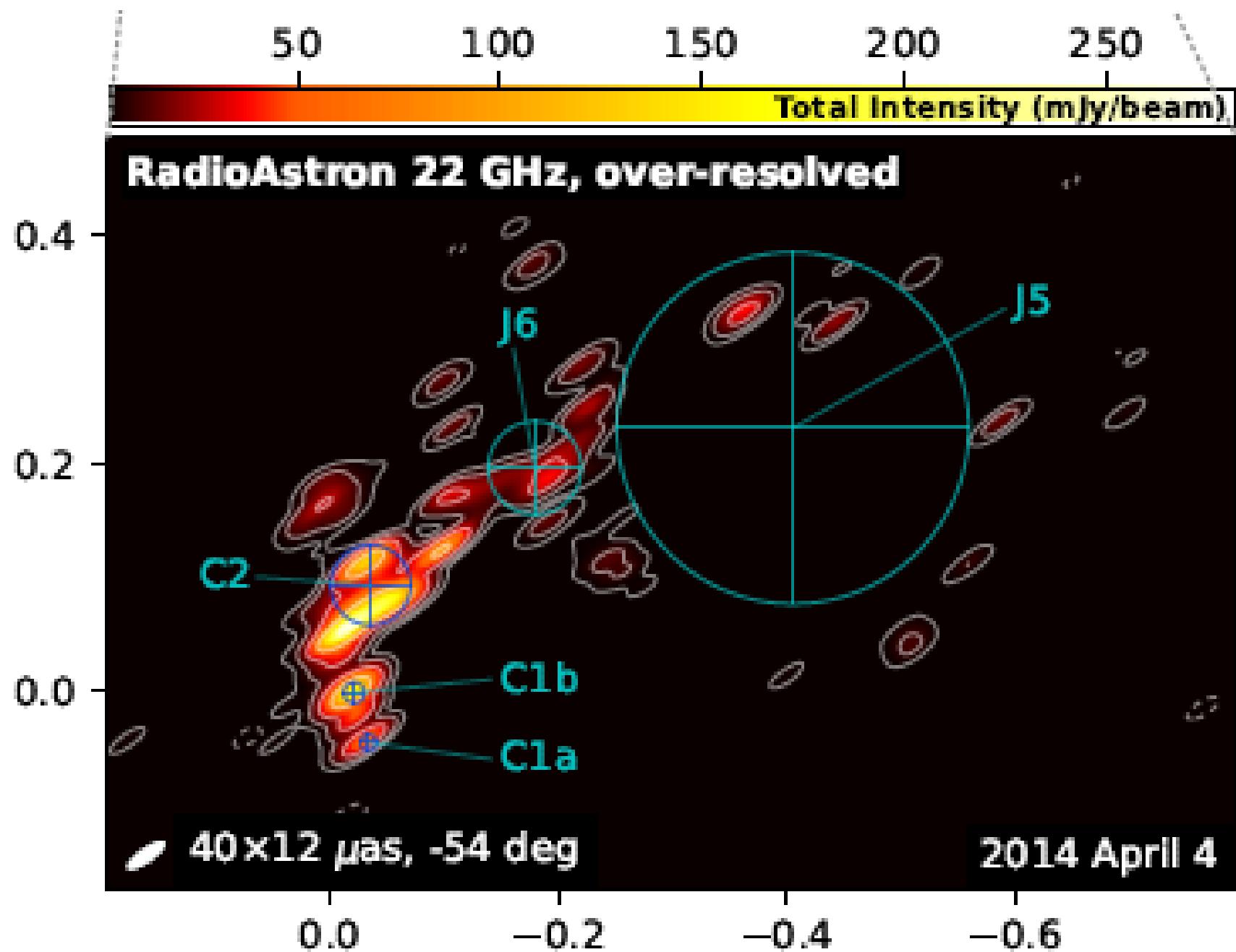


- Interpretation:
- Roche lobe of secondary filled with disk gas -> giant IDV flare
- Secondary goes through disk -> Gamma ray flare
- Secondary pulls out disk gas -> Blue flare

- First two imply detection of the secondary jet

- Direct evidence? See the Radioastron map from 2014





Refining the OJ 287 2022 impact flare arrival epoch

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Table 1. The telescopes and systems used in the 2021/2022 OJ 287 observing campaign

Telescope	Measurement
Atlas	R-band
Skynet	R-band
Krakow	R-band
Osaka	R-band
Mt.Suhora	R-band
Jena	R-band
NOT	R-band
Liverpool-La Palma	polarisation
Hiroshima	polarisation
Turku-Hawaii	polarisation
Ondrejov	BVRI spectrum
NASA-Swift	UV and x-rays
NASA-Fermi	gamma-rays
Metsähovi	radio

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