X-ray, ultraviolet, optical and near-infrared polarimetric signatures of the receding torus model

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Dusty tori in active galactic nuclei

Picture :

- Gas and dust torus around an active supermassive black hole
- Unresolvable with current telescope (artistic view, top figure)

Problematic :

- What is its size ? Composition ? Motion ? Evolution ?

Current theory:

- The inner radius and maximum height of the torus is a proportional to the ionizing luminosity from the central source (« the receding torus»)

How to test it :

- Polarization is sensitive to the geometry of the scatterer
- Time-resolved polarimetry is the key to track sources with variable luminosity

Polarization from the receding torus

Ideal target : NGC 4151, which shows variations of its intrinsic X-ray flux (and photon index Γ) with time

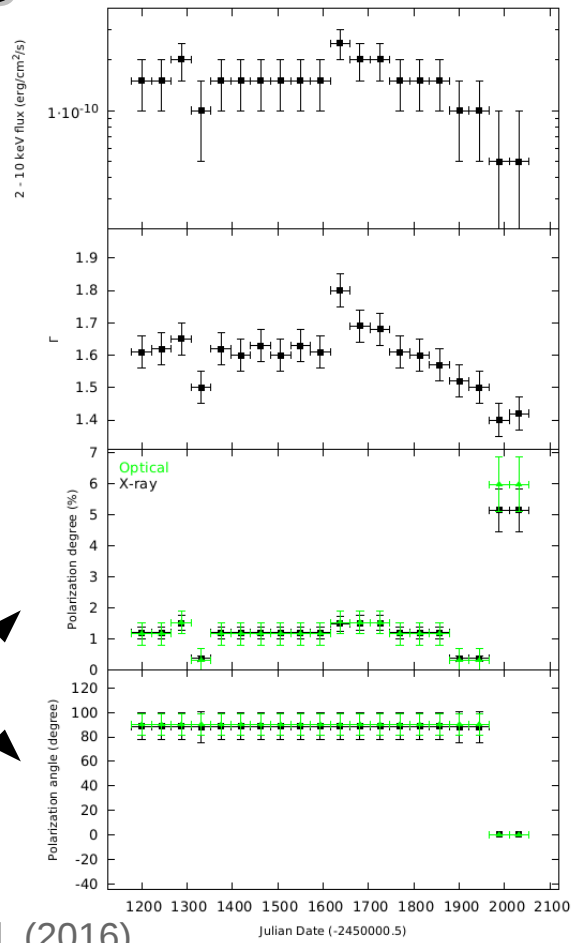
Simulations : broadband Monte Carlo code that accounts for polarization (Goosmann & Gaskell 2007, Marin et al. 2012, 2015)

Results :

- UV/Optical/NIR polarization : we reproduce the already observed polarization (consistency check of the model)

- X-ray polarization : predictions for future X-ray polarimetric telescopes. Polarization highly variable → traces the evolution and morphology of the torus

Polarimetry as a crucial tool to resolve the unresolvable !



Marin et al. (2016)