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Evidence for short-term column density variability in the nearby changing-look Compton thick AGN NGC 1358: results from a multi-year NuSTAR-XMM-Newton monitoring to characterize the obscuring medium nearby accreting supermassive black holes

In this talk, I will present the results of a multi-epoch monitoring with NuSTAR and XMM-Newton of NGC 1358, a heavily obscured AGN whose properties made it an ideal changing look candidate.

The source was indeed found to be highly variable in line-of-sight column density (N_{Hlos}) over time-scales from weeks to years, even transitioning from a Compton thick state ($N_{\text{Hlos}} > 10^{24} \text{ cm}^{-2}$) to a Compton thin one. By measuring both luminosity and column density variability over such a wide range of time-scales, we found a tentative anti-correlation between the two parameters: the more luminous the AGN, the smaller the amount of N_{Hlos} . Such a result can be understood in the framework of Chaotic Cold Accretion clouds driving recursive AGN feedback.

Besides this important result, our monitoring campaign proved how a multi epoch X-ray monitoring is key to simultaneously constraining the three otherwise highly degenerate parameters that define the obscuring medium geometry: the torus average column density and covering factor, and the inclination angle between the torus axis and the observer.

In the final part of the talk, I will briefly discuss how we plan to soon extend this multi-epoch approach to a larger sample of heavily obscured, nearby AGN, to better characterize the properties of the obscuring material surrounding accreting supermassive black holes, as well as constrain AGN feeding models.

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