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Unveiling multiphase quasar-driven outflows in PG 1114+445

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Supermassive black hole (SMBH) winds are believed to be a key player in the evolution of galaxies. In fact, outflows from active galactic nuclei (AGN) may be one of the fundamental mechanisms by which a SMBH transfers a significant fraction of its accretion energy to the surrounding environment. Disk-scale ionized ultra-fast outflows (UFOs) and large-scale warm absorbers (WAs) are commonly found in the X-ray spectra of many Seyfert galaxies and quasars. Even though a correlation between these two absorbers has been suggested in the past, a direct link is still missing. Here we present the analysis of 12 XMM-Newton EPIC spectra in which, together with WA and UFO, we found a 'low-ionization UFO'. This absorber has the same velocity as the UFO ($v \sim 0.15c$), but ionization and column density comparable with the WA ($\log(\xi/\mathrm{erg\ cm\ s\hat{}\{-1\}}) \sim 0.5$ and $\log(N_H/\ \mathrm{cm\hat{}\{-2\}}) \sim 21.5$, respectively). Moreover, independently on the assumption of either momentum- or energy-conserving UFO-WA interaction, this absorber shows a low value of the clumpiness, $Cv \sim 10^{-3}$. This strongly suggests that this absorber is produced by the interaction between the UFO on the surrounding WA, and that such interaction occurs via entraining of a fast UFO on the WA, pushing a fraction of clumps to comparable velocities, producing the observed 'entrained ultra-fast outflow' (E-UFO).

Topic

Active Galactic Nuclei: accretion physics and evolution across cosmic time

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