

Recent optical spectral variability in the first gamma-ray detected NLS1: the case of PMN J0948+0022.

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Narrow-line Seyfert 1 (NLS1) are a subset of AGN that accrete matter near or above the Eddington limit. Some of these galaxies can generate relativistic jets and emit gamma rays, as demonstrated by PMN J0948+0022, the first identified gamma-ray NLS1. In the early 2000s, its optical spectrum showed weak forbidden lines and a narrow $H\beta$ line with a Lorentzian profile, indicating turbulent motion in the nuclear gas. However, recent observations with XSHOOTER and MUSE revealed a composite line profile, with a broad component and a narrow peak, typical of Intermediate Seyfert (IS), a poorly understood class of AGN whose nature is still unclear. The analysis of optical spectra from SDSS, XSHOOTER, and MUSE taken at different epochs suggests a change of the physical conditions around the supermassive black hole. These observations offer new insights into the changing-look AGN phenomena, and, particularly, about the transient nature of IS and NLS1 galaxies within the AGN lifecycle, showing how these two classes of gamma-ray emitting sources can be linked, and enriching our understanding of AGN evolution.

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