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Polarimetry of GSN 069: the source of the quasi-periodic eruptions

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GSN 069 is a high Eddington-ratio Seyfert galaxy that exhibits an unabsorbed highly variable X-ray spectrum typical of a Seyfert 1, but it does not show broad emission lines in its optical spectrum, which leads to a Seyfert 2 classification. It could be then considered as a true Seyfert 2 candidate. Those candidates are thought to accrete at low Eddington rates, unable to sustain the broad line region (BLR). Nevertheless, GSN 069 exceeds the theoretical accretion rate at which a BLR is formed.

On the other hand, since December 2018 and during 54 days, GSN 069 has exhibited a new X-ray variability pattern characterized by high-amplitude quasi-periodic X-ray bursts over a rather stable quiescent flux level. This new phenomenon has been dubbed X-ray quasi-periodic eruptions (QPEs) (Miniutti et al. 2019, *Nature*, 573, 318). Since its discovery with GSN 069, QPEs have been identified in a very few sources and their driving mechanism remains unknown. In the specific case of GSN 069, some models point to a possible tidal disruption event (TDE) as possible origin of the exhibited QPEs, but more observational efforts are needed for a better understanding.

Polarimetry is the only technique capable of demonstrating the existence of hidden-BLRs. It has also been demonstrated that the degree of polarization is sensitive to TDEs (Wiersema et al. 2020, *MNRAS*, 491, 1771). Thus, in this work we report imaging polarimetry and spectropolarimetry of GSN 069 with FORS2@VLT to explore both scenarios, the true Seyfert 2 candidacy and the possibility of a TDE in GSN 069.

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