Contribution ID: **155** Type: **Talk**

General relativistic precession of orbits around the stellar-mass black hole in H 1743-322

Wednesday 16 December 2015 14:00 (25 minutes)

Accreting stellar mass black holes often show a quasi-periodic oscillation (QPO) in their X-ray flux with a period that slowly drifts from ˜10s to ˜0.05s and an iron emission line in their X-ray spectrum. The iron line is generated by fluorescent re-emission, by the accretion disk, of X-ray photons originating in the innermost hot flow. The line shape is distorted by relativistic motion of the orbiting plasma and the gravitational pull of the black hole. The QPO arises from the immediate vicinity of the black hole, but so far its physical origin has remained unknown. I will present observations of the iron line in the black hole binary H 1743-322 where we find that the line energy varies quasi-periodically, in step with the ˜4.5s QPO cycle. This result provides strong evidence that this class of QPO originates via Lense-Thirring precession, a General Relativistic effect causing the inner flow to precess as the spinning black hole twists up the surrounding space-time. This is the first demonstration of Lense-Thirring precession in the strong field regime of General Relativity. The precession occurs at a rate 14 orders of magnitude faster than in all previously reported examples, in the Earth's gravitational field. Our result enables the application of tomographic techniques to precisely map the motion of matter in the strong gravity near black hole event horizons.

Author: Dr INGRAM, Adam (University of Amsterdam)

Co-authors: Prof. DONE, Chris (University of Durham); Dr ALTAMIRANO, Diego (Southampton University); Dr HEIL, Lucy (University of Amsterdam); Dr AXELSSON, Magnus (Tokyo Metropolitan University); Dr MIDDLETON, Matthew (Cambridge University); Prof. VAN DER KLIS, Michiel (University of Amsterdam); Dr UTTLEY, Phil (University of Amsterdam)

Presenter: Dr INGRAM, Adam (University of Amsterdam)

Session Classification: 16 - Black holes