

## A precision orbital ephemeris for Sco X-1

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The low-mass X-ray binary Sco X-1 remains the key target for CWG searches, given that it by far outstrips other candidates in terms of expected strain. Efficient searches require the orbit of the NS to be well-constrained. We have been exploiting optical emission lines that trace the binary companion star in the system for over 20 years now. These Bowen fluorescence lines have been an important probe of binary parameters in a number of XRBs, but in the case of Sco X-1 our focus has been to provide a robust and precise ephemeris for the binary orbit of the neutron star. We will review the technique to highlight how we have not just improved the precision over time, but also have addressed some of the possible systematics of the method and ensure that robust parameter uncertainties can be derived. Whilst this has allowed us to obtain very precise timings for the overall phasing of the neutron star orbit, other parameters relevant to CWG searches (asini, e, ...) remain difficult to constrain accurately. We discuss these limitations as well as prospects for continuing to keep the ephemeris accurate during O4 and beyond.

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