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SALT spectroscopy of the accreting millisecond pulsar binary SAX J1808-3658 during its recent increased activity

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Following the announcement of increased optical activity of the accreting millisecond pulsar binary (AMXP) SAX J1808-3658 on July 30 (ATel# [12964](#)) and of an abrupt brightening beginning August 5 (ATel #[12993](#)) and August 6 (ATel #[13000](#)), we carried out long-slit optical spectroscopy on August 2, 3 and 6 with the Southern African Large Telescope (SALT). We used the Robert Stobie Spectrograph (RSS) with the PG900 VPH grating, covering the region 4060-7120Å at a mean resolution of 4.7Å, using frame transfer mode with repeated 200 sec exposures. No spectrum was registered in an accumulated 2400 s exposure on August 2.964 UTC (JD 2458698.4640), although there was a focus issue. On August 3.958 UTC (JD 2458699.4576), a weak spectral trace was detected in an accumulated 2200 s exposure. Starting on August 6.938 UTC (JD 2458702.4381) the object was considerably brighter and 12 repeat 200 s exposures were obtained, revealing Balmer absorption lines and strong interstellar NaD absorption. The summed spectrum (2400 sec) reveals absorption lines of H α , H β and H γ , typical of an optically thick accretion disc seen at moderately low inclination and very similar to the spectrum seen by Cornelisse et al. 2009 (A&A, 495, L1) during the 2008 outburst. The H α and H β lines also show central emission reversals, almost filling in the former. He II 4686Å is weakly detected in emission, while there is no evidence of Bowen emission (NIII 4634Å /CIII 4647-4659Å).

[SALT spectrum of SAX J1808.6-3658 6 Aug2019](#)