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Anomalous structure in photodetachment to excited states of the O atom[1] JOHN YUKICH, COLIN TYZNIK, Davidson College — The electron affinity is defined as the difference in energy between the ground state of a negative ion and the ground state of the corresponding neutral atom. The $^2P_{3/2} \rightarrow {}^3P_2$ photodetachment threshold (at the electron affinity) for ions such as S^- and O^- has been examined in numerous experiments. In many of these experiments, structure due to Zeeman and cyclotron transitions has been resolved. Our most recent experiment explores transitions to the first two excited states of the O neutral, $^2P_{1/2} \rightarrow {}^3P_0$ and $^2P_{1/2} \rightarrow {}^3P_1$, in an attempt to detect similar Zeeman and cyclotron structure. The apparatus in the experiment includes a Penning ion trap which creates, traps and stores the O- ions, and a single-mode, tunable, amplified diode laser. Our observations indicate possible structure that differs in appearance from that of spectroscopy conducted at the electron affinity, and which demands significant further investigation.

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