

Abstract Submitted  
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**Analytic descriptions of ultracold electron-atom collisions**<sup>1</sup> BO GAO, University of Toledo, ALEX DALGARNO, ITAMP — From the quantum defect theory<sup>2</sup> (QDT) and the multichannel quantum defect theory<sup>3</sup> (MQDT) for an attractive polarization potential, we derive both a QDT expansion and a MQDT expansion, that together provide analytic descriptions of low-energy electron collisions with atoms in a ground  $^1S$  or a ground  $^2S$  state. The expansions are accurate over an energy range from the zero kelvin to hundreds of kelvins, and include effects of hyperfine structure if it is present in cases of  $^2S$  atoms. Results for electron-hydrogen hyperfine-changing collisions are presented as an example.

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<sup>2</sup>Gao, PRL, **104**, 213201 (2010); PRA, **88**, 022701 (2013).

<sup>3</sup>Li *et al.*, PRA **89**, 052704 (2014); Li and Gao, PRA **91**, 032702 (2015).

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