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**Direct Measurements of Electron Correlation in Atoms<sup>1</sup>**

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Electron impact double ionization can be used to measure the correlated motion of electrons in atoms provided that the ionization proceeds by discrete binary collisions over times that are short compared to orbital periods and that scattered and ejected electron interactions with the residual ion core are negligible. Furthermore, the precise mechanism of the ionizing collisions must be known. Two double ionization mechanisms (TS1 and TS2) involving the outer orbital electrons of magnesium have been experimentally identified that meet these criteria. These mechanisms have been characterized, and theoretically modeled. Through a proper choice of experimental geometry and kinematics the TS2 mechanism can be separated from TS1 and used for the direct measurement of correlated electron motion.

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