Elastic electron scattering off $A@C_{60}$ versus off $C_{60}$ versus off a free atom\footnote{Supported by a RUI NSF grant PHY-1305085.} MAISEY HUNTER, MATTHEW COOPER, VALERIY DOLMATOV, University of North Alabama — The recent decade or so has seen much of research on the structure and spectra of endohedral fullerenes $A@C_{60}$. However, to the best of our knowledge, electron elastic scattering off $A@C_{60}$ has so far escaped its study, despite of its obvious basic significance. Can one detect the presence of an encapsulated atom $A$ inside the hollow cage of $C_{60}$ by performing a $e^+A@C_{60}$ elastic scattering experiment? If a “yes”, how much does the atom $A$ in $A@C_{60}$ contribute to electron scattering off $A@C_{60}$ compared to scattering off empty $C_{60}$? If the encapsulated atom has a non-zero spin, could this lead to appreciable differences between scattering of oppositely spin-polarized electrons off $e^+A@C_{60}$? The present work unravels positive answers to the above questions within, so to speak, a zero-order approximation, as the very first step in understanding of $e^+A@C_{60}$ scattering. There, the $C_{60}$ cage itself is modeled by a spherical potential shell \cite[as in numerous $A@C_{60}$ photoionization studies, see, e.g., V. K. Dolmatov, Adv. Quant. Chem. 58, 13 (2009)], the atom $A$ is placed at the center of the shell, and, as a strong simplification of the problem, both the encapsulated atom $A$ and $C_{60}$ cage are regarded as rigid, i.e., non-polarizable targets. This study itself, as well as differences between its results and (future) more sophisticated calculations, should be viewed as a first step in identifying measurements to perform.