



Decay pathways of the K-shell excitations in atomic neon

U. Becker, R. Hentges, U. Hergenhahn, J. Viehhaus, and R. Wehlitz*

Fritz-Haber-Institut der Max-Planck-Gesellschaft,
D-14195 Berlin, Germany

*Dept. of Physics and Astronomy, Knoxville/TN 37996-1200, USA

Inner-shell excitations may decay in several steps depending on the final states of the first step Auger transition. If these states are above the double ionization threshold a second step Auger transition will occur. In order to correlate these two transitions unambiguously we have performed an electron-electron coincidence experiment. Figure 1 shows the two-dimensional coincidence diagram of the first and second step resonant Auger transitions following the Ne $1s \rightarrow 4p$ excitation. This method is particularly useful in tracing the various shake-up and shake-down processes along the decay cascade. Concerning the angular distributions of these Auger electrons we show that the first step Auger electrons are basically emitted isotropically, whereas the second step Auger electrons show considerable anisotropies depending the specific Auger transitions. This behavior is explained by the alignment created in each step assuming the validity of the "strict spectator model".

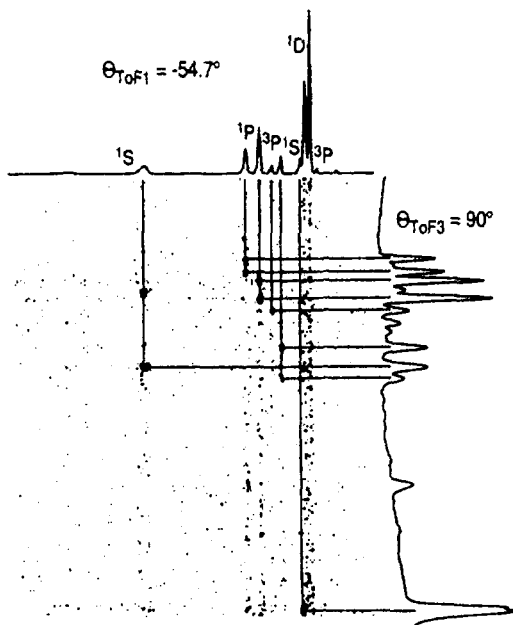


Fig. 1: Two dimensional coincidence spectrum of the resonant two-step Auger decay of the $1s \rightarrow 3p$ excitation in neon. The first step spectrum is taken under 54.7° , the second step spectrum under 90° with respect to the electric vector.