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Positron Scattering from Large Molecules.[1]

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We report on the experimental progress in positron scattering with biologically relevant molecules. In particular, large molecules, many of which are solid at room temperature requiring the use of a vacuum oven to produce a vapor suitable for beam experiments. Our positron source is comprised of a sealed sodium-22 (^{22}Na) source, rare gas (neon) moderator (RGM) coupled to a Surko-style buffer gas trap (BGT). This system can produce an energy tunable positron beam which is pulsed and has a thermal energy spread. A room temperature scattering cell is used for gaseous and liquid targets, and a vacuum oven is used for targets which are solid at room temperature. The energy loss of the positron is used to discriminate between scattering channels allowing a range of scattering channels to be investigated. Of particular importance is the formation of the positronium (Ps) atom in positron-molecules collisions. Empirical models of the Ps formation cross section provides a reasonable guide, but no *ab initio* theory is available to describe the Ps formation cross section in positron scattering from large molecules. Our most recent work considered positron scattering from Pyridine, the simplest azine, has shown remarkable agreement between the independent atom model (IAM) with the screening additivity rule (SCAR) including interference effects. We will discuss the current state-of-the-art in positron-molecule scattering at energies above ˜1eV and comment on future work involving DNA and RNA basis. Additionally, we will discuss future work in positron molecules scattering below 1 eV.

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