

# THRESHOLD POSITRON SPECTROMETER FOR STUDYING ATOMS AND MOLECULES

M. C. A. Lopes<sup>1\*</sup>, P.M. Gordo<sup>2</sup>, A. P. de Lima<sup>2</sup>, J. R. Mohallem<sup>3</sup>

<sup>1</sup> *Departamento de Física, Universidade Federal de Juiz de Fora, Juiz de Fora, Brazil*

<sup>2</sup> *Departamento de Física, Universidade de Coimbra, Portugal*

<sup>3</sup> *Departamento de Física, Universidade Federal de Minas Gerais, Belo Horizonte, Brazil*

Threshold positron impact studies, which distinguish and detect positrons scattered by atoms and molecules, could be very important, because the selection rules are much more relaxed when compared with those applied for example to photoionization processes and also to electron scattering experiments. Various important processes occur in threshold positron impact excitation of atoms and molecules, by instance, resonance formation, positronium formation, annihilation, as well as energy exchange due to post-collision interactions. In the present work we present a threshold positron impact spectrometer, which is being developed for studying positron collisions with atoms and molecules in the energy range up to 150 eV. The spectrometer consists essentially of an electrostatic positron beam, an effusive gas source and a positron analyzer based on the penetrating field technique [1,2] for the efficient collection of threshold (nearly zero energy) positrons. The analyzer can be tuned to accept threshold positrons ( $< 20$  meV) and work with a power resolution better than 700, with a high signal/noise ratio. The electrostatic positron beam uses a  $^{22}\text{Na}$  source and a tungsten wire array moderator as “monoenergetic” positron generator. These low energy positrons are extracted, focalized and collimated at the entrance of an  $127^\circ$  electrostatic deflector using electrostatic lenses. Positrons selected by the deflector are accelerated and focalized at the collision region by another electrostatic lenses system.

## References:

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\*E-mail address: [clopes@fisica.ufjf.br](mailto:clopes@fisica.ufjf.br)