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Magnetic field–free measurements of the total cross sections for positron–neon and positron–argon scattering

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Synopsis Magnetic field–free measurements of the total cross sections for positron–neon and positron–argon scattering have been performed using an electrostatic high–brightness slow positron beam apparatus.

Low–energy antiparticles are becoming increasingly important for both scientific and technological applications. In particular, positrons offer new ways to study a wide range of phenomena including defects in condensed matter, the Fermi surface of metal, and scattering with atoms and molecules.

It is well known that positron interactions with atoms and molecules are characterized by a number of significant differences from those of electrons [1]; the cross sections are usually lower than that for the electron scattering at low energies. In 2010, a similarity has been uncovered between the total cross sections (TCS) for positronium, a bound state of a positron and an electron, and those for equivelocity electrons incident upon a wide range of targets [2]. For further understanding, reliable measurements of the cross sections for positron scattering are required.

Recently, the TCS for positron–helium scattering under magnetic field–free conditions were measured for the first time [3][4]. In the energy range 4–20 eV, the results were higher than most of the previous measurements [5]-[9] where magnetic fields were applied to transport to slow positrons efficiently.

In the present work, magnetic field–free measurements of the TCS for positron interaction with neon and argon have been performed at energies below 60 eV. The results and details aof the measurements will be presented at the conference.

References

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