

Abstract Submitted
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Positronium formation at the Surface of a Topological Insulator

THOMAS BATES, ALEX WEISS, Univ of Texas, Arlington — This research is focused on the study of the emission of positronium, Ps, at the surface of a topological insulator, Ba₂T₂Se. Ps is the hydrogen like bound state of an electron and its antiparticle, the positron. Here report on experiments in which a low energy ($\sim 10\text{eV}$) positron beam was used to deposit positrons at the sample surface. The energy spectrum of the gamma rays resulting from positron and electron annihilation was measured using a NaI(Tl) gamma detection system. The gamma spectrum was analyzed to determine the fraction of free Ps emitted into the vacuum from the surface. Our results indicate that the amount of free Ps emitted increases as the sample temperature is increased providing evidence that a portion of the positrons are bound in a surface state and annihilate at the surface at low temperatures. The existence of such a bound surface state suggests that positron annihilation spectroscopy could be used to obtain surface specific information regarding the electron momentum and spin distributions at the surfaces of topological insulators.

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