“固体所青联会”第四十六期学术论坛

报告题目： **How to probe the nanoworld with positrons**

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报告时间： **2016年10月18日上午9:00（周二）**

报告地点： **固体所新楼520会议室**

举办单位： **中科院固体物理研究所青年联合会**

中科院青年创新促进会合肥物质科学研究院小组

Abstract: One of the major challenges in many future nuclear reactor concepts is the intrinsic effect of radiation damage and helium on the formation of the microstructure of the irradiated material. Particularly in the early stages of material aging, the volution of the microstructure is controlled by the interaction of radiation-induced point defects (interstitials and vacancies) with transmutation hydrogen and helium. An understanding of this process and validation of some existing theoretical models inevitably requires experimental inputs. The experimental data on early stage radiation damage are still greatly demanded, mostly due to experimental limitations such as the limited spatial resolution of electron microscopy techniques, limited sensitivity to light elements in analytical techniques, and a low signal-to-noise ratio in measurements of activated samples by nuclear spectroscopy techniques.

The technique of positron annihilation spectroscopy (PAS) is known to be very sensitive to defects as small as mono-vacancies with concentrations as low as 0.1 appm. Besides, the interaction of positrons with defects in a crystalline structure is strongly influenced by the presence of hydrogen and helium. This makes positron the ideal probe for investigation of wide range of processes and phenomena in the nanoworld