**报告题目：**Silicon-Germanium Alloys: From Physics to Applications

**报告人：** Günther Bauer, Institut für Halbleiter-und Festkörperphysik,  Universität Linz, Austria

**报告时间：**10月10日（周三）10:30-11:30

**报告地点：**理科楼物理系三层报告厅

**报告摘要：**

In this talk an overview will be presented how basic physics studies on silicon-germanium alloys have contributed to advance semiconductor device engineering, both in electronics as well as in photonics.

In 2003 Germanium has been introduced into main stream Si technology for the fabrication of integrated circuits and has been used ever since. Due to the different lattice constants of Ge and Si mechanical strain is introduced which reduces the crystal symmetry and thus leads to a modification of the electronic band structure. This is used to enhance e.g. the carrier mobility in electronic CMOS devices and has been essential for the continued validity of Moore’s law up to now. In industrial devices based on planar technology, the maximum strain values employed are about 0.5%. However, in Si-cap layers on top of three-dimensional self-organized molecular beam epitaxy (MBE) grown SiGe islands deposited on two-dimensional periodic pit patterned Si substrates strains above 1% can be achieved to further enhance the electronic characteristics of field effect transistors. Synchrotron x-ray diffraction experiments with focused x-ray beams were used to determine the strain distribution even in a single working transistor.

Low-dimensional Si/Ge structures have attracted also considerable interest due to their comparatively long spin decoherence times. Quite recently it was proposed that ultra-thin,strained Ge nanowires can support helical modes, which renders them appealing for observing exotic quantum states, like Majorana fermions, too. First steps towards this goal, namely MBE growth of just 2 nm high Ge wires has been achieved and single-hole transport was observed.

**报告人介绍：**

GüntherBauer is a professor for Semiconductor Physicsat the University of Linz, Austria, since 1990. He has got his PhD at the University of Vienna, his habilitation in physics at the  Rheinisch-Westfälische Technische Hochschule Aachen, Germany, was then associate professor at the University of Ulm, moved to the Montanuniversität Leoben, Austria, as full professor and is since 1990 full professor in the Physics Department of the University of Linz, Austria. He has held visiting appointments at Oxford University and was a visiting professor at Brown University, Providence USA, and at Charles University, Prague.

His main research interests in semiconductor physics are hot carrier transport, magnetotransport and magnetooptics, molecular beam epitaxial growth of semiconductor nanostructures and at present structural and optical characterization of semiconductor hetero-and nanostructures.

He is a fellow of the American Physical Society and a member of the Austrian Academy of Sciences. He won AAAS Prize for International Scientific Cooperation in 2001.