

PAES: Positron annihilation induced Auger electron spectrometer

Heinz Maier-Leibnitz Zentrum
Technische Universität München

Instrument Scientists:

- Christoph Hugenschmidt, Heinz Maier-Leibnitz Zentrum (MLZ), Technische Universität München, Garching, Germany, phone: +49(0) 89 289 14609, email: christoph.hugenschmidt@frm2.tum.de

Abstract: Positron annihilation induced Auger electron spectroscopy (PAES) is a newly developed application for surface studies with high elemental selectivity and exceptional surface sensitivity. The instrument is operated by the Technische Universität München and is located at NEPOMUC.

1 Introduction

In PAES, the emission of Auger electrons is initiated by positron-electron annihilation that leads to several major advantages compared with conventional electron induced AES. The main features are:

- topmost layer sensitivity
- no secondary electron background at the Auger peaks
- non-destructive technique

PAES is part of the **surface spectrometer** (SuSpect) which also enables sample preparation in UHV conditions, conventional AES and XPS. Examples for PAES studies are surfaces with sub-monolayers of foreign atoms, high resolution determination of Auger line shapes, element selective surface studies.

2 Technical Data

2.1 Beam properties

- Positron implantation energy: $E = 20 \text{ eV}$
- Electron energy resolution: $\Delta E/E < 1 \%$

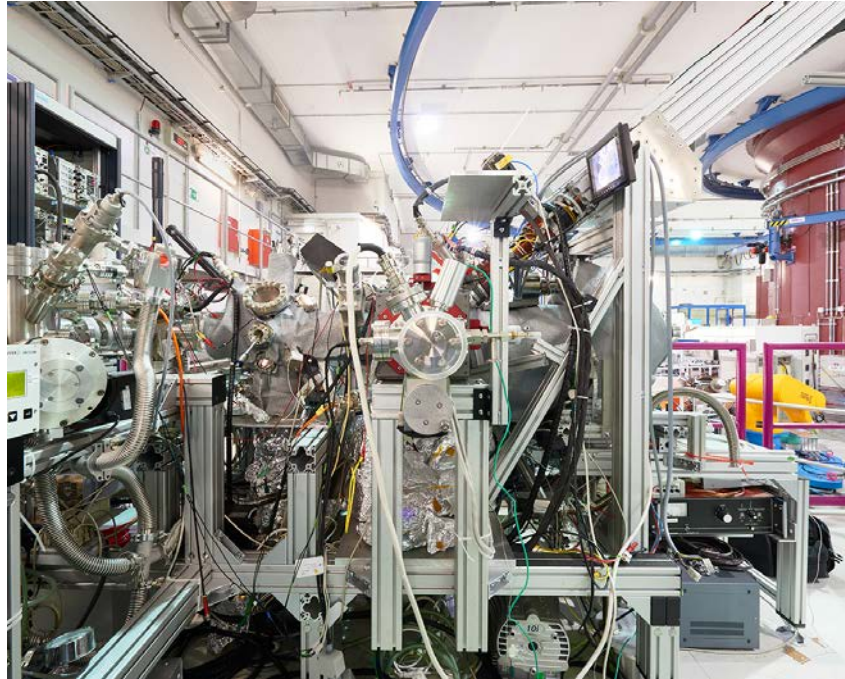


Figure 1: Instrument PAES, which is part of the surface spectrometer SuSpec at NEPOMUC (Copyright by W. Schürmann, TUM).

2.2 Sample

- Sample size: \varnothing 10 mm
- Sample thickness: 0.5 mm (0.1 - max. 3 mm)

2.3 Typical measurement times

- Measurement time (typical for one PAES spectrum): 10 – 15 min

2.4 Complementary techniques

- Electron or X-ray induced AES
- XPS
- STM