

GSI innovationFund

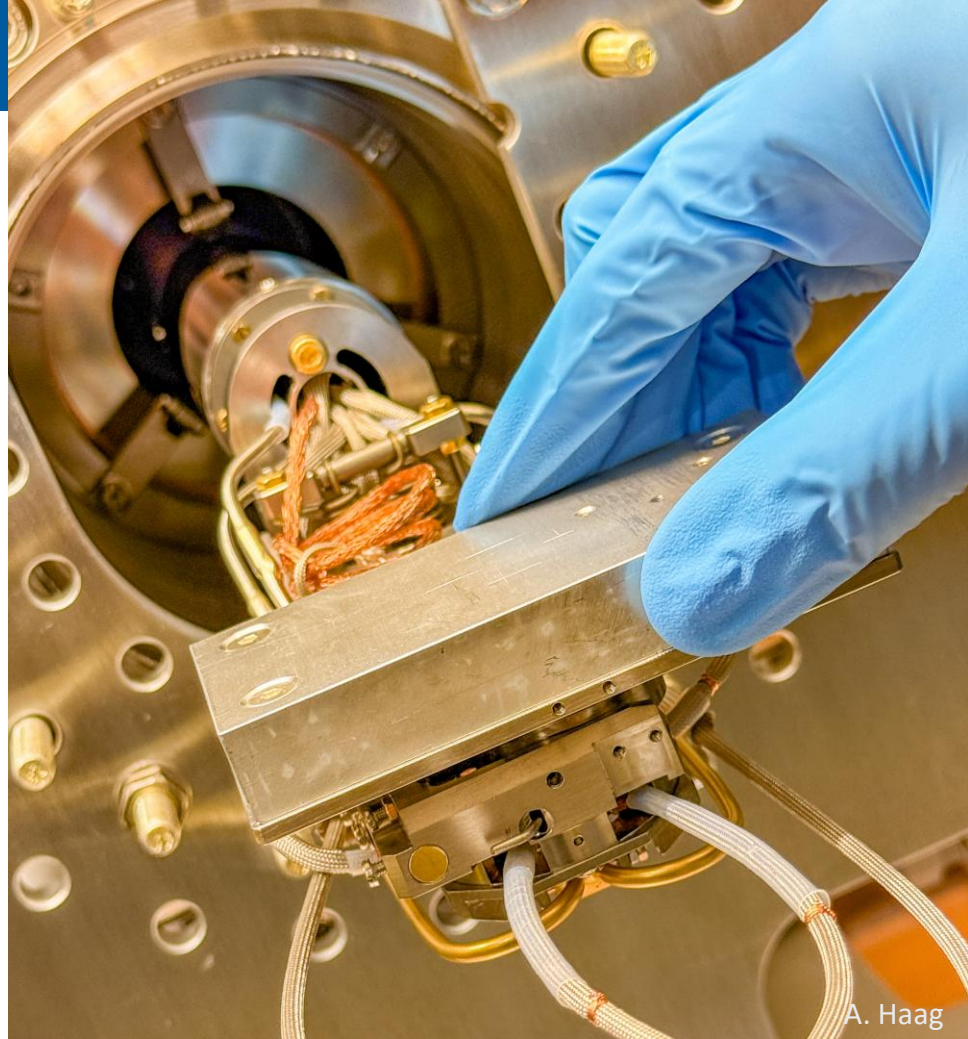
Concept & Projects at the Helmholtz-Institute Jena

Arno Klenke



How to enhance technology readiness from fundamental research?

→ **Internal funding program to apply for time and money to validate and advance know-how and technologies for applications**



Organisation



Overview



**apply for time and money to
validate and advance technology**

- Feasibility study, proof-of- concept, prototype, ...
- Market study, industry partnering, ...
- Service concept development, customer acquisition, marketing, ...
- Business plan and Start-up project...

Facts & Figures 2022 - 2024

over
1.2 M€
total fund volume

12
innovation
projects

1
new
invention

2
patent
applications

4
cooperations
with industry /
university partners

1
spin-off
pre-project

New Transfer Model
for Open-Source
Hardware

Revenues from first
industry beam time

GSI innovationBoard 2025-2027

The GSI innovation board supports the projects through their development



Dr. Ralf Aßmann
ACC



Prof. Dr. Vincent Bagnoud
PPH



Dr. Arno Klenke
HIJ



Prof. Dr. Thorsten Kolleger
CIT



Dr. Bettina Lommel
TTL



Dr. Christian Schmidt
DTL



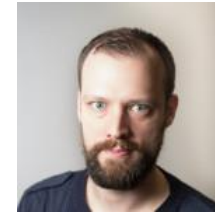
Dr. Haik Simon
SFR



Dr. Peter Spiller
SIS



Prof. Dr. Ulrich Weber
BIO



Dr. Arne Wickenbrock
HIM

Some criteria for an application

1. Innovation content should be clearly visible, above state-of-the-art
2. Project goals have to be feasible in the timeframe (in general ≤ 3 years)
3. Structured working plan with clear milestones
4. Risk analysis needs to be present
5. GSI needs to be involved in the potential commercial success

A future industrial application or transfer possibility has to be visible

How does the application process work

Applications are possible throughout the year

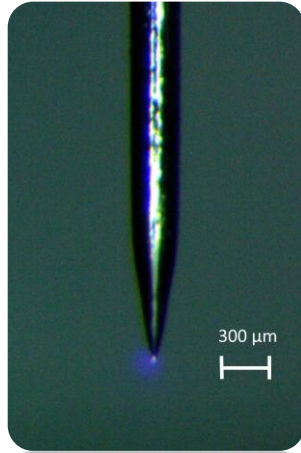
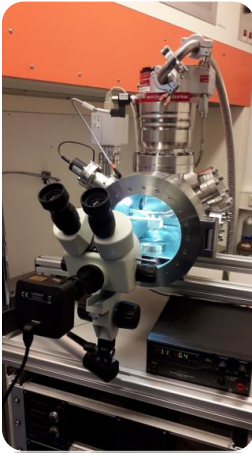
- Initial application: 1 page PDF to be filled out
- Proposal is then presented at one of the innovation board meetings
- After approval, the full proposal is submitted

- Proposals < 50k€ are approved by the innovation board
- Proposals > 50k€ get a recommendation from the innovation board

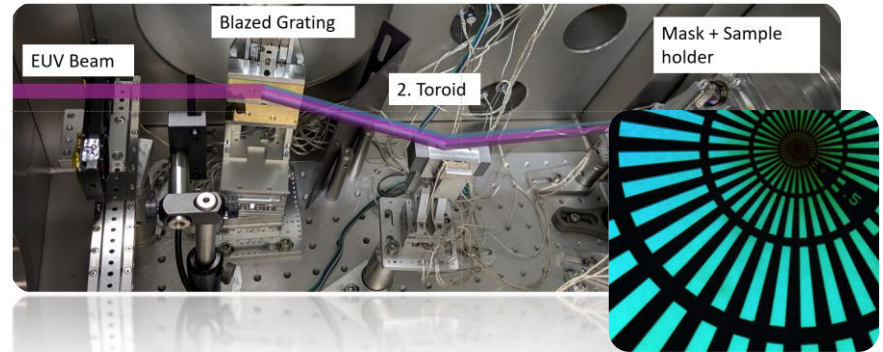
GSI innovationFund at the HI Jena

Two projects at the Helmholtz-Institute Jena were recently funded by the GSI innovationFund

Variable Liquid Metal Ion Source (V-LMIS)



Multispectral EUV Ptychography



Variable Liquid Metal Ion Source (V-LMIS)

- **PI:** PD Dr. Frank Machalett / HI Jena
 - Co-PI: Prof. Dr. Thomas Stöhlker / HI Jena
 - Team members: T. Weber and (temporary) students (A. Sommerfeld, J. Hacker)
- **Industrial partner:** JEVATEC GmbH Jena
- **Timeframe:** 01.01.2024 – 31.12.2025
- **Budget:** 221'137 €

Follow-up project funded by the Thüringer Aufbaubank

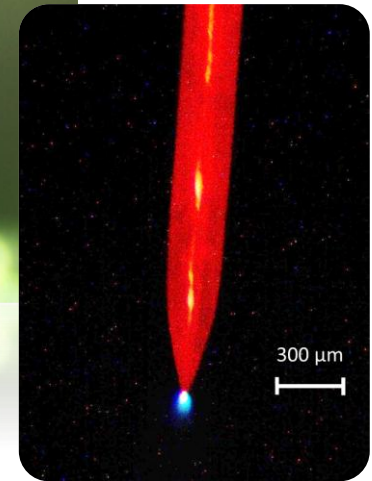
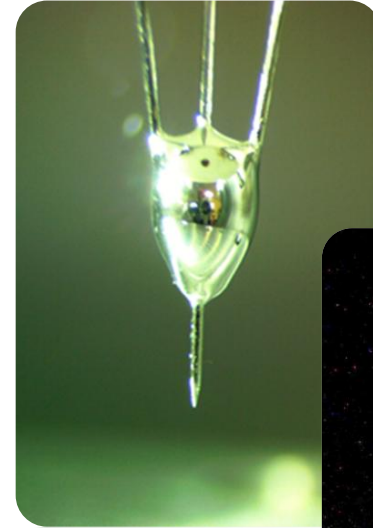
Variable Liquid Metal Ion Source (V-LMIS)

Principle:

- Liquid metal ion source
- Field evaporation of ions from liquid metal / alloy on a needle tip

Advantages:

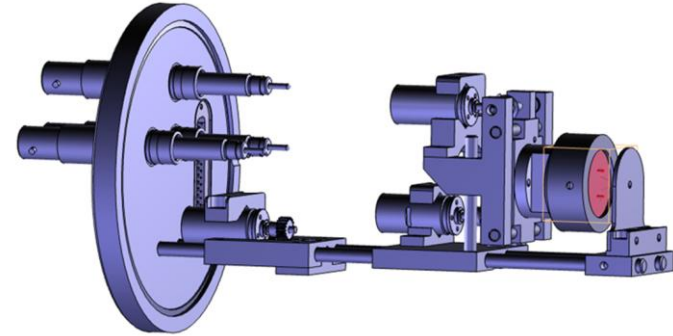
- High brightness ($10^6 \text{ A cm}^{-2} \text{ sr}^{-1}$)
- Low emittance ($1\text{-}10 \pi \text{ mm mrad}$)
- Small virtual source size (20 nm)
- High phase-space density
- Simple design



Variable Liquid Metal Ion Source (V-LMIS)

Results:

- Prototype built and operational
- Stable ion emission for Gallium and Au-Si emitter
- Freedom to operate
- Patent application submitted
- Cooperation with JEVATEC GmbH Jena to commercialize this source
- Follow-up project (FTI Thüringen Technologie, State of Thuringia)



Multispectral EUV Ptychography

- **PI:** PD Jan Rothhardt
 - Team members: Leona Licht, Johannes Reents
- **Industrial partner:** potential Spin-off
- **Timeframe:** 01.03.2025 - 31.12.2025
- **Budget:** 108 000€

Follow-up project: MediEUV (BMFTR funded), with UKJ, IOF and Active Fiber Systems GmbH

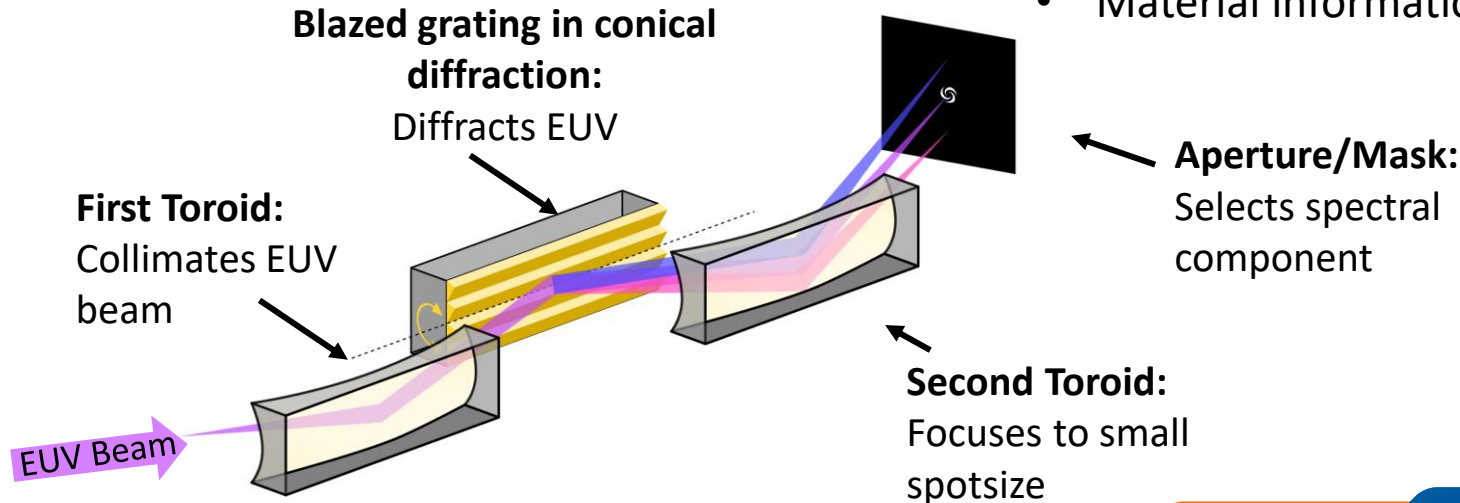
Multispectral EUV Ptychography

Principle:

- Grating-based, tunable EUV monochromator
- Subsequent ptychography measurement with adjustable wavelength

Advantages:

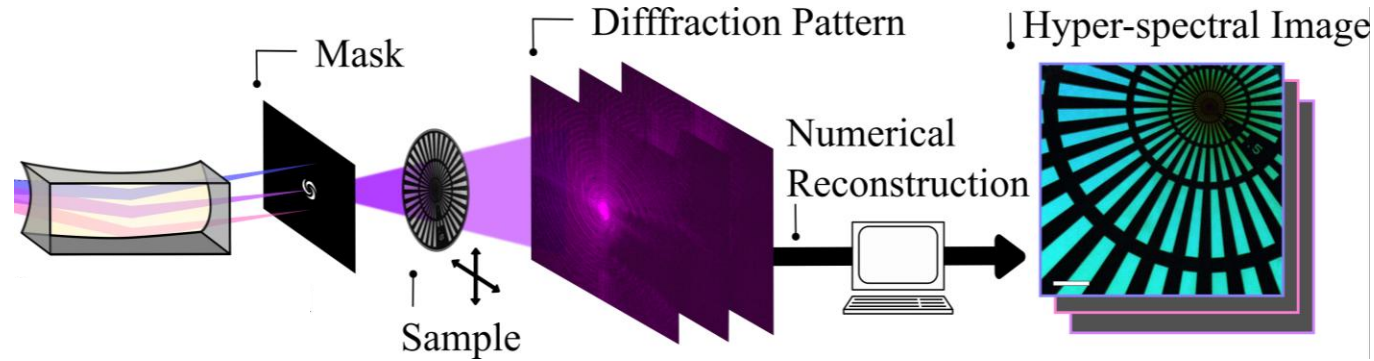
- High diffraction efficiency (<80%)
- High EUV transport efficiency (<5%)
- High spectral coverage (30eV- 150eV)
- Many absorption edges accessible
- Material information can be retrieved

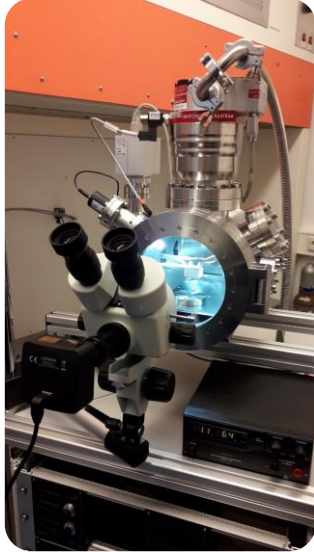


Multispectral EUV Ptychography

Results:

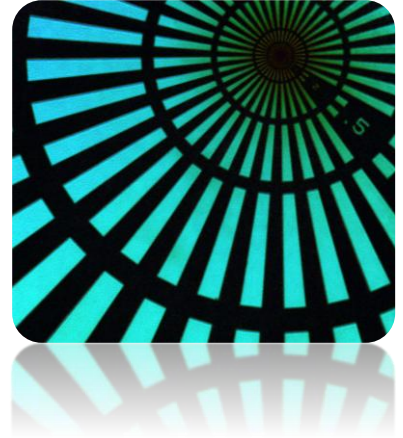
- Prototype in the EUV built and characterized
- First successful ptychography measurement
- Patent: J. Rothhardt and W. Eschen, Ptychographisches Bildgebungsverfahren und -system, DE 10 2025 148 488 A1, 2026
- Follow-up project (Medi-EUV)





For more information see:

<https://www.gsi.de/ttr/gsi-innovationsfonds>



Thank you for your attention