

Welcome to the 18th Science Council Meeting of the Helmholtz Institute Jena



Thomas Stöhlker

MEMBERS OF THE SCIENTIFIC COUNCIL

Peter Thirolf, Ludwig Maximilians University München, Germany

Emmanouil Benis, University of Ioannina, Greece

Arno Ehresmann, University of Kassel, Germany

Paul Indelicato, Sorbonne Université, Campus Pierre et Marie Curie, Paris, France

Anke-Susanne Müller, Karlsruhe Institute for Technology, Germany

Marek Pajek, Jan Kochanowski University, Kielce, Poland, Poland

Jörg Schreiber, Ludwig Maximilians University München, Germany

DISTINGUISHED GUESTS

Prof. Dr. Isabelle Staude – Dean PAF FSU, Jena

Dr. Thoralf Held – Chancellor FSU, Jena (excused)

Prof. Dr. Andreas Marx – President FSU, Jena (excused)

Prof. Dr. Thomas Pertsch – Vice President for Research and Innovation, FSU Jena (excused)

Beatrix Kunze – BMFTR

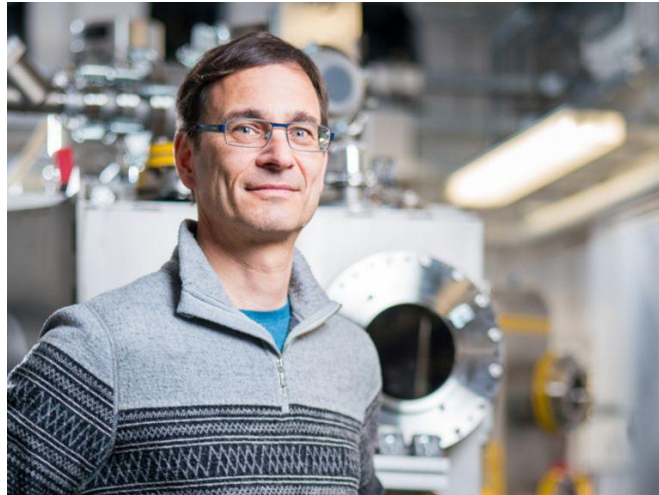
Jana Podßuweit – TMBWK, Thuringia

Dr. Ilja Bohnet – Office HGF (excused)

WELCOME: NEW MEMBERS OF DIRECTORATE

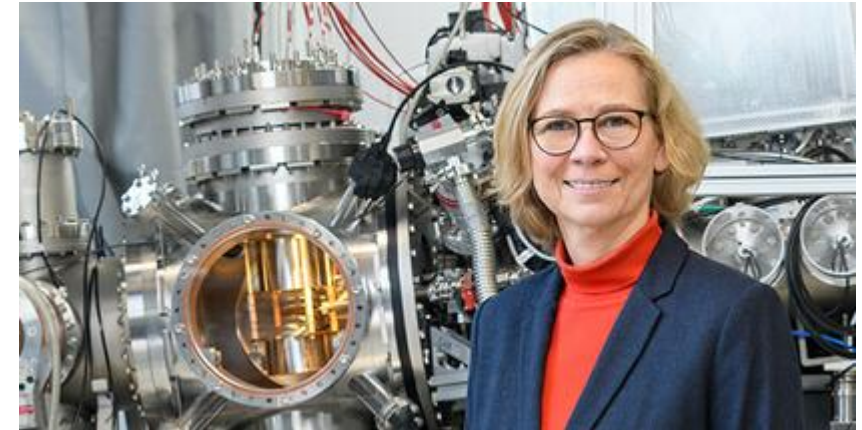
Ulrich Schramm

HZDR; Director of Institute for
Radiation Physics and Head of
Laser Particle Acceleration Division



Britta Redlich

DESY; Director in charge
of Photon Science



Preliminary Agenda
18th Scientific Council Meeting of the Helmholtz
Institute Jena,
October 7th to 8th, 2026

Oct 7th Seminar Room HI Jena Friedrich-Schiller-Universität Jena, Fraunhoferstr. 8, 07743 Jena				
	Time	Subjects		Duration
Wednesday	13:30	Closed Session	Scientific Council only	30'
		Open Session		
		• Welcome		
	14:00	• Current Developments at the Institute and Clarification of Remaining Questions from the 17 th Scientific Council Meeting 2025	Thomas Stöhlker	30' + 20'
	14:50	• Recent Developments on Laser-driven Fusion at GSI Darmstadt	Vincent Bagnoud	15' + 05'
	15:10	Coffee Break		30'
	15:40	• Matter Competence Team (MCT) "Technologies for Fusion Energy and Frontiers of Optics" (FEOPT)	Malte Kaluza	15' + 05'
	16:00	• GSI Innovation Fund: Concept and Projects at the Helmholtz Institute Jena	Arno Klenke	15' + 05'
	16:20	• InnoEUV: Results and Outlook	Jan Rothhardt	15' + 05'
	16:40	• Lab-based Correlative Fluorescence and Soft X-Ray Microscopy	Sophia Kaleta	15' + 05'
	17:00	Current Developments at GSI / FAIR	Yvonne Leifels	20' + 10'
	17:30	Strategy of HI Jena to Deal with the UNILAC Incident	Thomas Stöhlker	15' + 05'
	17:50	Transfer to the Hotel*		
	19:00	Dinner		

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Oct 8th Seminar Room HI Jena Friedrich-Schiller-Universität Jena, Fraunhoferstr. 8, 07743 Jena				
	Time	Subjects		Duration
Thursday		Open Session		
		<i>Scientific Reports from the Research Areas</i>		
	8:30	• Measuring Vacuum Birefringence: The Dark Field Concept	Aimé Matheron	15' + 05'
	8:50	• Quantitative Theoretical Predictions of the Signals in Quantum Vacuum Experiments	Felix Karbstein	15' + 05'
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	9:30	• Simulations of Relativistic Solitons and their Radiation Emission	Daniel Seipt	15' + 05'
	9:50	• Atomic Computations for Multiply & Highly-charged Ions: Dielectronic Recombination	Stephan Fritzsche	15' + 05'
	10:10	Coffee Break		30'
	10:40	• Introducing the ¹⁸¹ Ta Nuclear Resonance for Precision Metrology Applications	Bharti Pandit	15' + 05'
	11:00	• Quantum Sensos at the Helmholtz Institute Jena: Current Status	Johanna Walch	15' + 05'
	11:20	• High Precision Mass Spectrometry of Highly Charged Ions	Rima Schüssler	15' + 05'
	11:40	• Helmholtz Investigator Group: Quantum Logic Spectroscopy	Peter Micke	15' + 05'
	12:00	Lunch		90'
	13:30	Closed Session	Scientific Council only	60'
	14:30	Closed Session / Close-Out		30'
	15:00	End of 18th Scientific Council Meeting of HI Jena and Transfer*		

Slides and supplementary material are available on the meeting's Indico page, indico.gsi.de/e/hij-sc-2026, attached to the respective contributions.

The screenshot displays the Indico interface for the HI Jena Scientific Council Meeting 2026. The header bar is blue with the text "HI Jena Scientific Council Meeting 2026". Below the header, the event details are shown: "Oct 7 – 8, 2026", "Helmholtz Institute Jena", and "Europe/Berlin timezone". A search bar is located on the right. On the left, a sidebar contains navigation links: "Overview", "Registration", "Timetable" (highlighted), "WiFi and Zoom Details", "Travel and Venue", and "Contact". The "Contact" section includes an email address "sekretariat@hi-jena.gsi.de" and a phone number "+49 3641 947601". The main content area is titled "Timetable" and shows a calendar view for "Wed 07/10", "Thu 08/10", and "All days". A legend indicates "Closed Session" (purple) and "Open Session" (yellow). The timetable for Wednesday, October 7th, is as follows:

Time	Session Title	Location	Speaker
12:00 - 13:30	Welcome and Lunch	Foyer New Building, Helmholtz Institute Jena	
13:30 - 14:00	Closed Session	Seminar Room 104, Helmholtz Institute Jena	
14:00 - 14:50	Current Developments at the Institute and Clarification of Remaining Questions from the 17th Scientific Council Meeting 2025	Seminar Room 104, Helmholtz Institute Jena	Thomas Stöhker
14:50 - 15:10	Recent Developments on Laser-Driven Fusion at GSI Darmstadt	Seminar Room 104, Helmholtz Institute Jena	Vincent Bagnoud
15:00 - 15:10	Coffee Break		

Current Developments at the Institute



Thomas Stöhlker

- Introduction to the Institute
- Questions and Tasks from the 17th Science Council Meeting
- Current Developments Related to POF V
- Awards, Young Scientists
- Budget, Personnel, and 3rd Party Funding
- Miscellaneous (Publications etc.)
- Summary

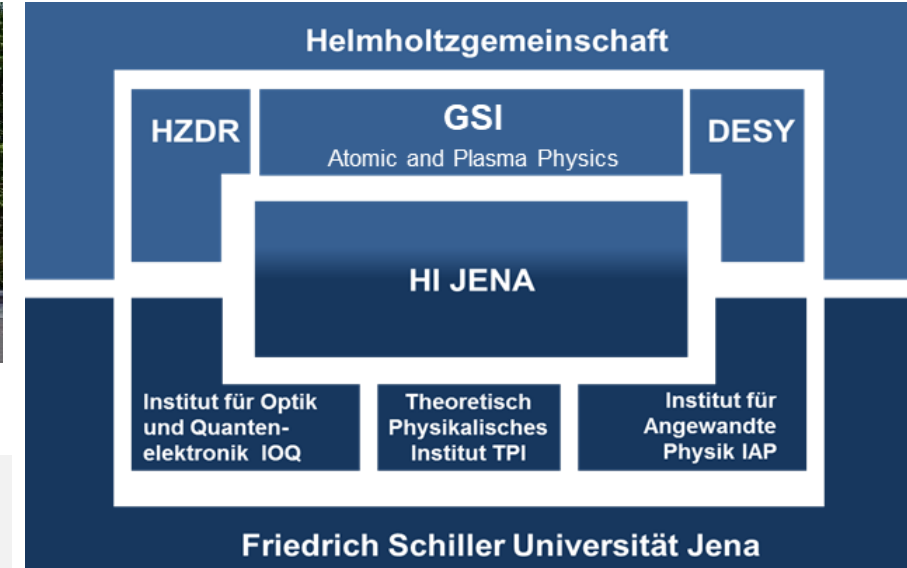
HELMHOLTZ INSTITUTE JENA: INSTITUTE OF GSI AT THE CAMPUS OF FSU JENA



Important Milestones

- 2009: Foundation of the Institute
- 2012: Fröbelstieg 3 – Institute's Building available
- 2014: Participation in POF of the Helmholtz Association
- 2017: Participation in Center Evaluation
- 2019: Green light for new Institute's Building
- 2020: Participation in strategic HGF Evaluation IV
- 2022: Inauguration of new Institute's Building
- 2025: Participation in Center Evaluation for POF V
- 2026: Participation in strategic HGF Evaluation**

Additional Partners



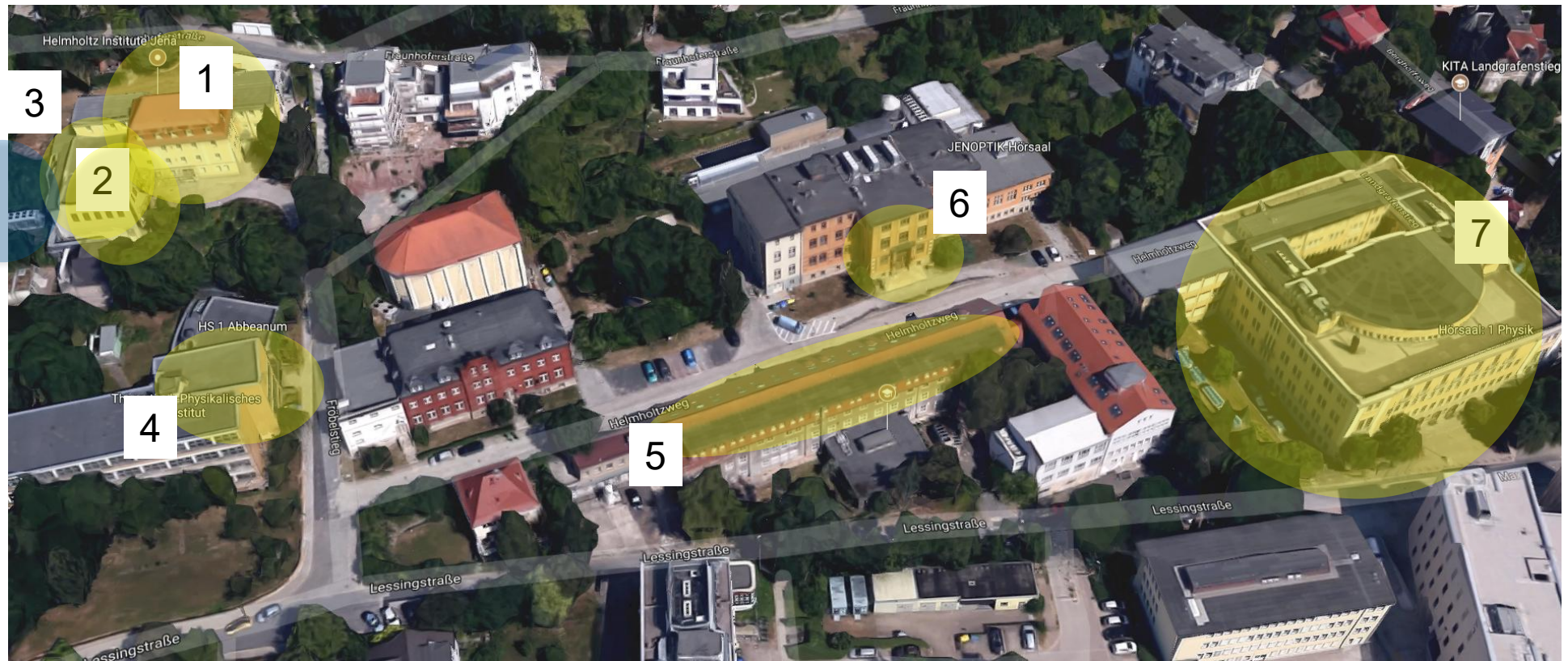
• Science

*extreme electromagnetic fields and warm
dense matter, coupling of intense light to matter*

• Technology

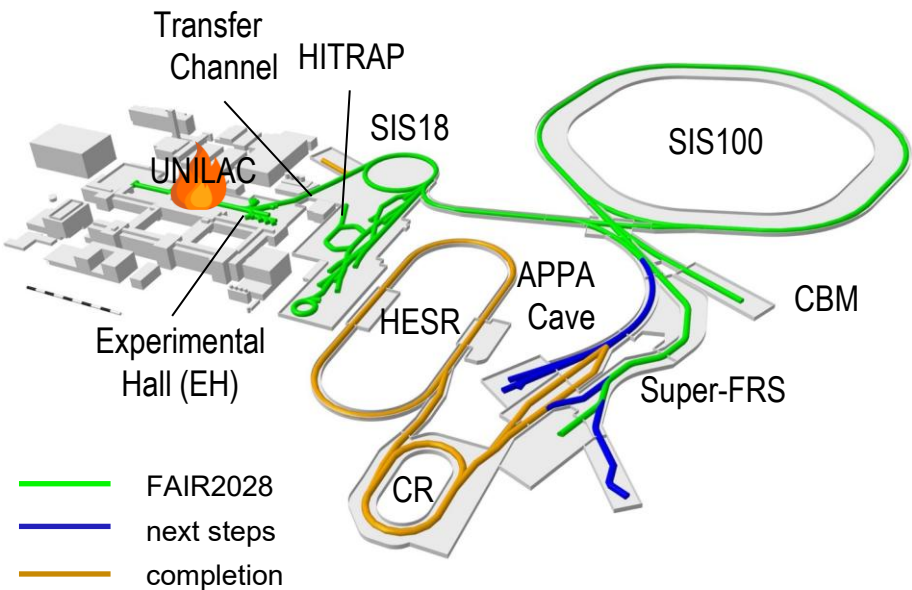
*measurement techniques and diagnostics
(laser, spectrometers, detectors etc.)*

Helmholtz Institute Jena at the Campus of FSU Jena



- 1 The Institute (offices, JETI200) 2 POLARIS 3 New building 4 TPI (theory) 5 Offices
6 Workshops, laboratories for cryo-technology 7 IOQ, JETI 40, X ray lab, workshops
+ 8 offices and laboratories located at the IAP + Fraunhofer (Beutenberg)

FIRE INCIDENT AT UNILAC (FEB. 2026)



No persons have been harmed

No toxic substances observed

Date & time

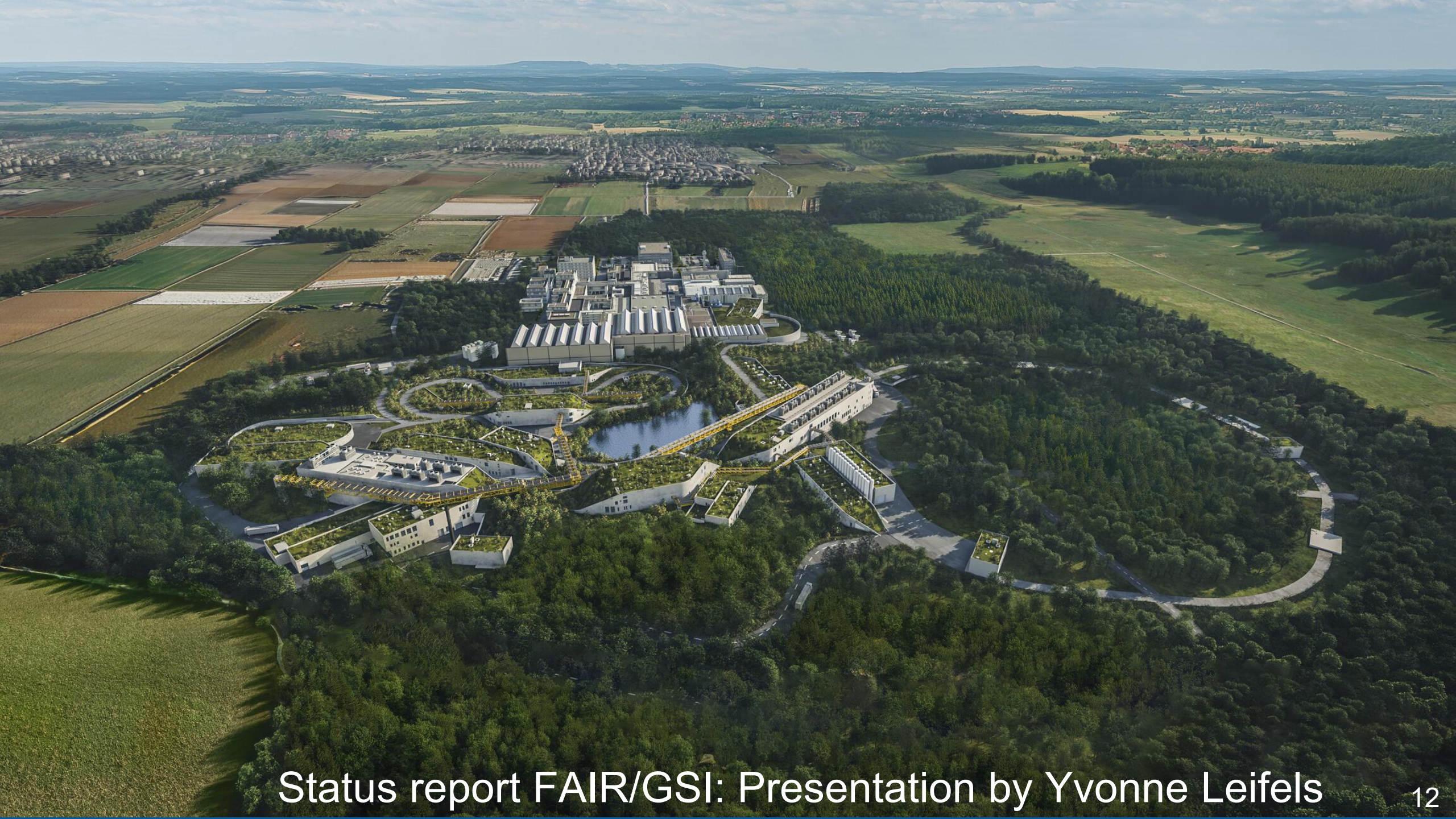
February 5th 2026
6 am

location

High-frequency (HF) operation area for the UNILAC accelerator

Not affected:

- SIS18 synchrotron & experiments (ESR, FRS, CRYRING, HITRAP)
- PHELIX high-power laser
- FAIR construction site



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INNOVATION POOL PROJECTS (HI JENA)

(01.01.2025 – 31.12.2027)

HI-J looks forward to learn about the new Innovation Pool projects in one of the next SC meetings.

STRUCTURED LIGHT

Structured light for advanced laser plasma accelerators

Involved partners: DESY, HI-Jena, HZDR, KIT

QS4PHYSICS

Quantum sensing for fundamental physics, common development of quantum sensor technologies

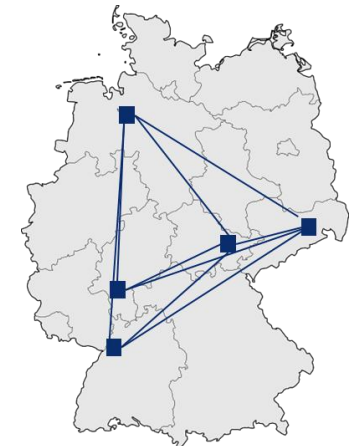
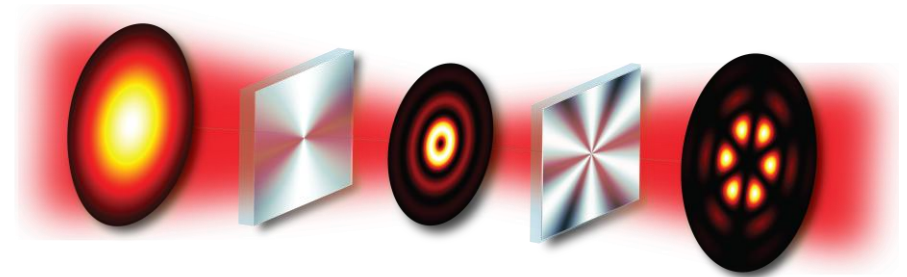
Involved partners: DESY, GSI, HI-Jena, HI-Mainz, HZDR, KIT

HELFEN

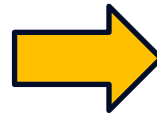
Helmholtz Laser-Fusion Energy Network

Involved partners: DESY, GSI, Hereon, HI-Jena, HZDR, KIT

Budget @ HI-Jena	123 K€
BMFTR	53 K€
HI-J/own budget	70 K€



HIJ-SC specifically congratulates Dr. Rima Schüssler for her successful application to establish a Helmholtz Young Investigator group in the context of the HITRAP facility at GSI/FAIR and looks forward to exciting science being reported in future meetings.



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SYNERGIES BETWEEN THEORY AND EXPERIMENT

The HIJ-SC acknowledges this year's focus on synergistic aspects between various experimental groups on joint projects. In this spirit, the SC expresses interest to receive a presentation during next year's meeting that highlights synergies between theoretical and experimental research activities.

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Synergy:
Theory &
Experiment

STRENGTHENING THE STRATEGIC LINK BETWEEN GSI AND UNIVERSITIES FOR APPA SCIENCE

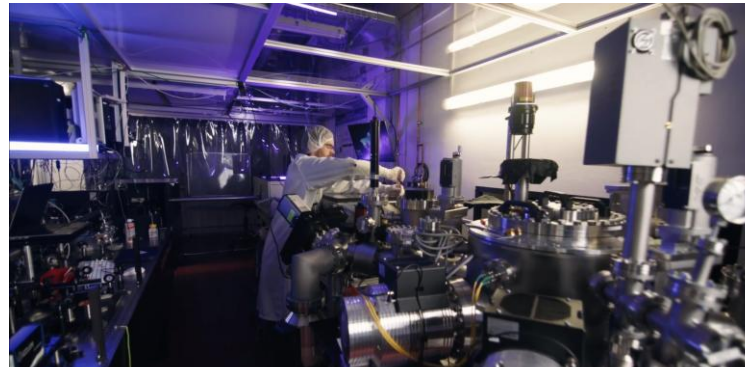
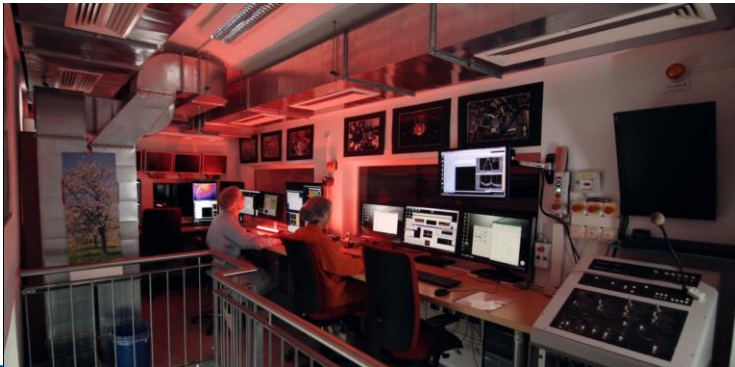
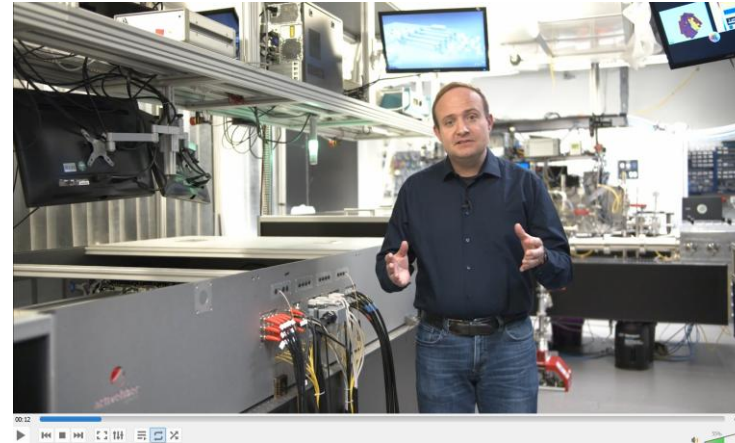
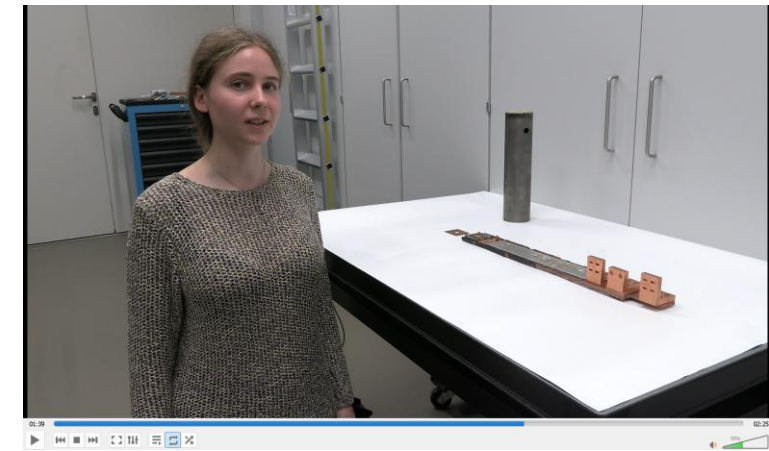
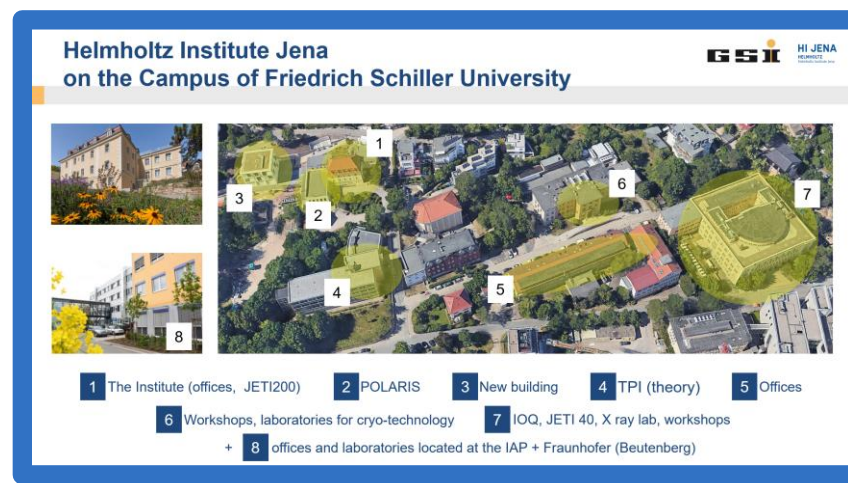
W3 Professorship at University of Frankfurt



Professorship (W3) on spectroscopy of ions in traps and storage rings to strengthen the connection of the Department of Physics at Goethe University with APPA and SPARC programs at GSI and FAIR.

The partners, GSI and U Frankfurt are working on the cooperation agreement!

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Virtual lab tour via video clips from the various laboratories at HI-Jena.

Strategic Evaluation of the Research Field Matter

Impressions of the Event (at MDC in Berlin-Buch, 26–28 May 2026)





Strategic Evaluation of the Research Field Matter

Agenda for MATTER Participants

Venue: MDC Berlin, Robert-Rössle-Str. 10, 12125 Berlin 201

Hotel Panel: Victor's Residenz-Hotel, Am Friedrichshain 17, 10407 Berlin-Mitte

Hotel Matter: INNSiDE by Meliá, Chauseestrasse 33, 10115 Berlin

Cloud: <https://syncandshare.desy.de/index.php/s/SKNScgKWdmA6FdC?dir=/Strategic%20Evaluation>

Day 0, Tuesday, May 26, 2026

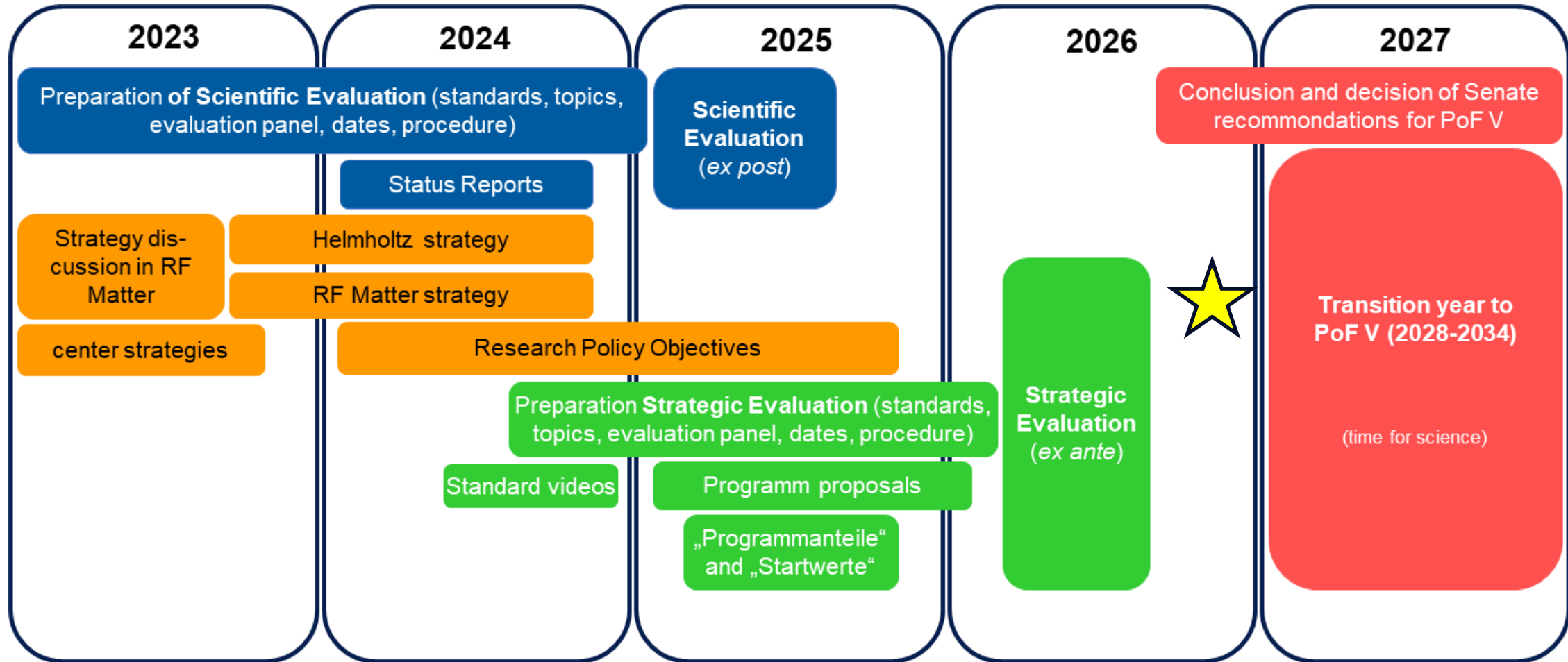
Victor's Residenz-Hotel

Participants: Vice President, Board Members (one per center), Program speakers and Co-speakers, Topic Speakers, Program Coordinators, Organizing Team

Please organize transfer on your own

4:00 pm	Come together
4:30 pm	Welcome and Introduction
4:30 pm 5'	Welcome
4:35 pm 25'	General Introduction to the Helmholtz Strategy President of the Helmholtz Association, Martin Keller
5:00 pm 20'	Research Policy Objectives of the Ministries Representatives of federal and state ministries
5:20 pm	Strategy of the Research Field & Cross-Cutting Activities Sebastian Schmidt
6:00 pm	Dinner Participants: Board Members and Program Spokespersons

NEXT STEPS TOWARDS POF V



★ Here we are!

Overall assessment and financial recommendation

	Funding categories
	A/B/C
Matter and the Universe	
Fundamental Particles and Forces	A
Cosmic Matter in the Laboratory	B
Matter and Radiation from the Universe	A
Matter and Technologies	
✗ Accelerator Research and Development	A
✗ Detector Technologies and Systems	A
Data Management and Analysis	B
From Matter to Materials and Life	
✗ Matter – Dynamics, Mechanism, and Control	B
Materials – Fundamentals, Function, and Processes	B
Life – Structure, Function, and Regulation Across Scales	A

Based on the starting values for the individual topics and the assessments of the strategic evaluation an arithmetic mechanism distributes the approximately 2 % annual increase of the entire research field's LK I-budget across the topics according to three categories A, B or C assigned by the strategic review panel.

C = no annual increase

B = about half of the annual increase of the entire research field's budget

A = the annual increase of the entire research field's budget plus funds freed up by C and B

✗ **Involvement of HI Jena**

HELMHOLTZ

Helmholtz Institute Jena within the Research Field Matter

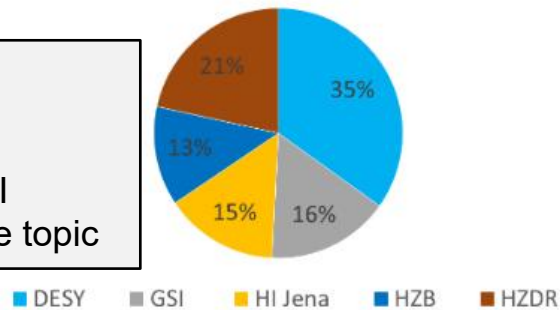
(Contribution of HI-Jena to GSI research activities within POF)

Core Budget (2025): 7164 k€ (2% annual increase); 69 FTE thereof 26 PhD students

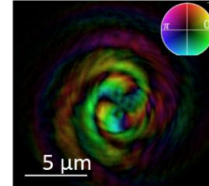
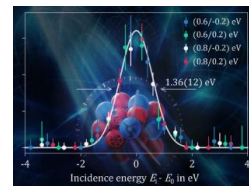
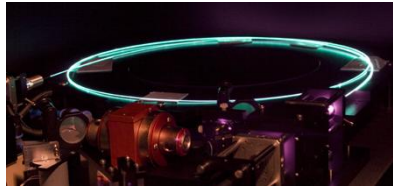
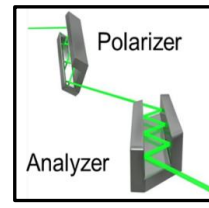
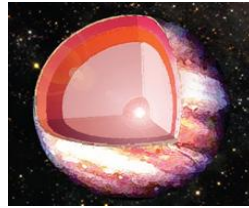


Matter Year 2023

60 %
of HI-J budget
FTE: 49 % of GSI
contribution to the topic

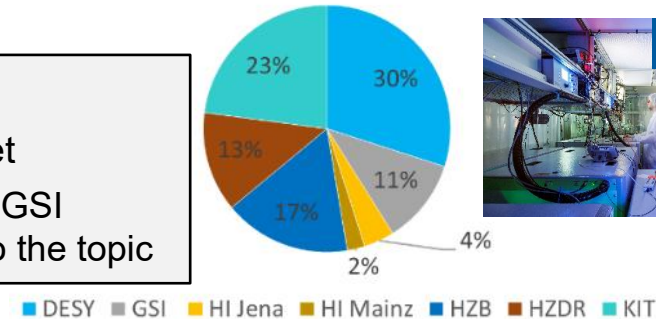


B

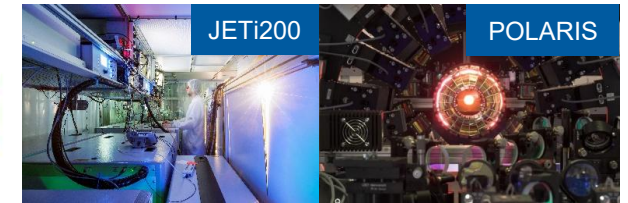


ARD Year 2023

32 %
of HI-J budget
FTE: 24 % of GSI
contribution to the topic

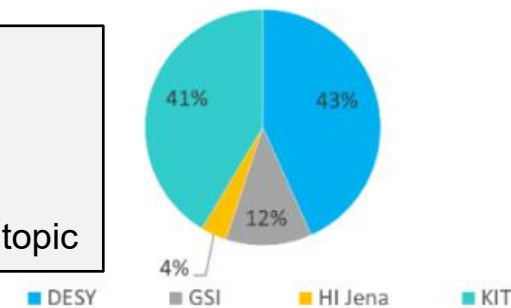


A



DTS Year 2023

8 %
of HI-J budget
FTE: 25 % of GSI
contribution to the topic



A



Presentation of the assessment results

- Matter presents a remarkably **coherent, scientifically ambitious, and strategically important portfolio**
- The overall strategy is **exceptionally well aligned with national and European research policy objectives**
- A particular strength of the field is its ability to **connect world-leading facilities, advanced instrumentation, computational capabilities, and interdisciplinary expertise**
- The three programs [...] form a **highly complementary ecosystem in which fundamental discoveries, technological innovation, and application-oriented research** mutually reinforce one another.
- The field benefits from exceptional **complementarities among the participating Helmholtz centers** and from access to internationally leading infrastructures
- The current distribution of resources across the three programs appears broadly appropriate and reflects the complementary nature of their missions.

- Are the two review processes the right tools for achieving the goals? Would a single review be better? The overall effort involved was very significant!
- Is the central role of research infrastructures in the Matter Research Area sufficiently taken into account in the review process?
- The inclusion of the results of the scientific reviews of the centers was useful. However, “translating” the centers’ logic into the program logic is difficult, especially if there are changes to the program structure for the next PoF period.
- Closer integration of the FoPoZi into the program proposals was sensible.
- Competition between the topics was rather artificial; normally, cooperation is the norm.
- Just one volume of program proposals, entirely digital.

Helmholtz’s process for “Lessons Learned” is organized across several working groups



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PhD program

- Lecture Weeks and Power Weeks organized by HGS-HIRe
- Dedicated series of Soft Skills courses for physicists organized by HGS-HIRe
- Teaching qualification courses organized by the Graduate Academy of University of Jena

Cooperation

Helmholtz Graduate School for Hadron and Ion Research “**HGS-HIRe for FAIR**” (cooperation agreement signed 16.04.2013)

Graduate Academy

Friedrich Schiller University Jena

Abbe School of Photonics

Friedrich Schiller University Jena

of PhD students in RS-APS

Year	# PhD
2019	59
2020	58
2021	58
2022	55
2023	63
2024	55 (# grad 10)
2025	50 (# grad 4)
2026	53 (# grad 7)

Spokesperson

Christian Spielmann



Scientific Coordinator

**Currently vacant,
position advertised**



Currently (October 2026)

- 25 students HI-Jena budget (scholarship or working contract)
 - 28 students 3rd party (including TP-GSI)
- In total 53 PhD students, thereof
- 30 % female students
 - 50 % foreign students

February 2026:

Special Lecture Week “Physics and Technology of Inertial Fusion Energy with focus on Laser Technology & Sources”

*Hosted by Erasmus+,
opened to HGS-HIRe and RS-APS participants*

Erasmus+
Enriching lives, opening minds.

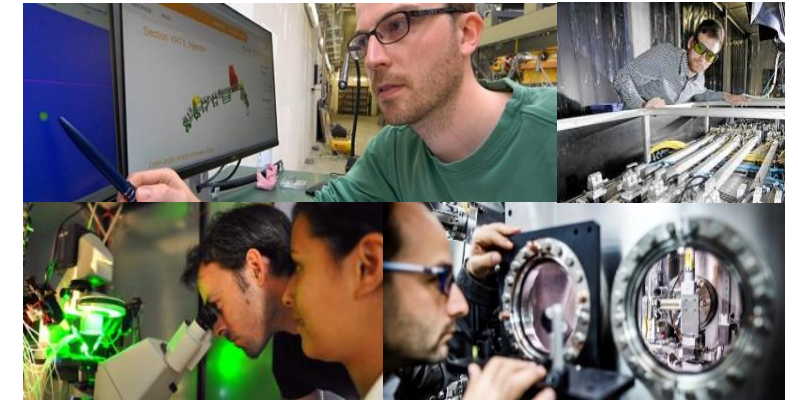


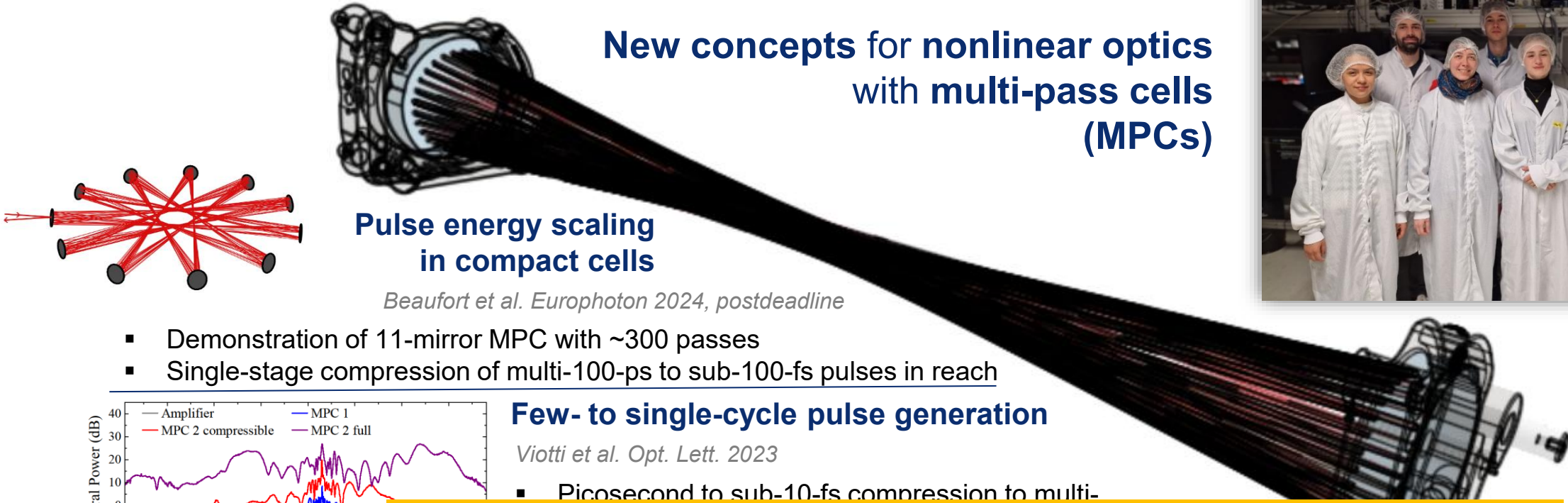
Innovative Education & Training
in Laser Inertial Fusion Energy



Co-funded by
the European Union

Biweekly RS-APS
seminar for PhD
students and other
members of HI-Jena
(online)



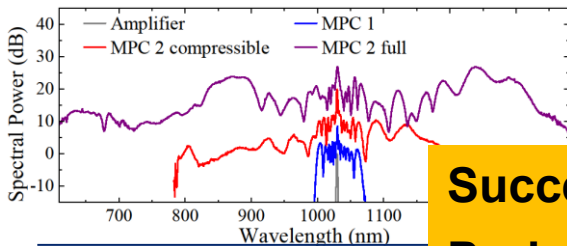


**New concepts for nonlinear optics
with multi-pass cells
(MPCs)**

**Pulse energy scaling
in compact cells**

Beaufort et al. Europhoton 2024, postdeadline

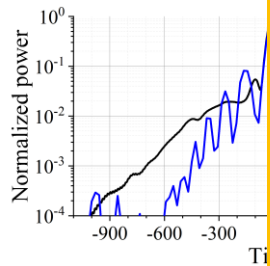
- Demonstration of 11-mirror MPC with ~300 passes
- Single-stage compression of multi-100-ps to sub-100-fs pulses in reach



Few- to single-cycle pulse generation

Viotti et al. Opt. Lett. 2023

- Picosecond to sub-10-fs compression to multi-



Successful in junior scientist contest (BMFTR) “Talents for Fusion”

Project: “Incoherent Gas Nonlinear Optics with Yb:YLF Lasers at Cryogenic Temperatures” (3.7 M€ for 5 years, started in June 2025)

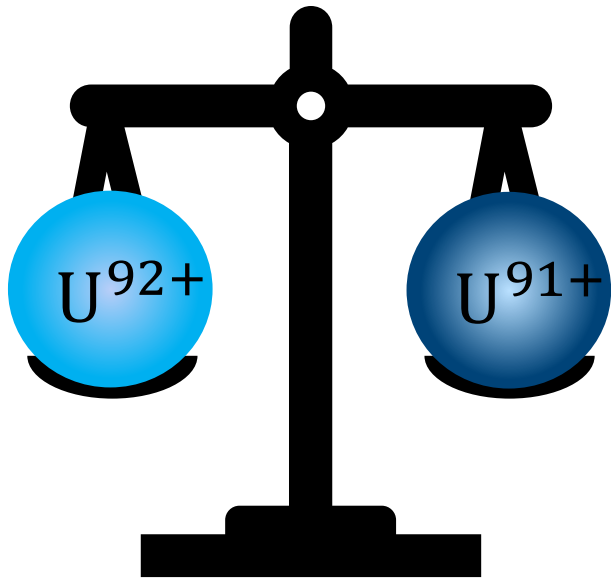
**YIG was jointly evaluated by DESY and HI Jena in September 2026
with highest marks**



APPLICATION FOR A HYIG LED BY DR. RIMA SCHÜSSLER

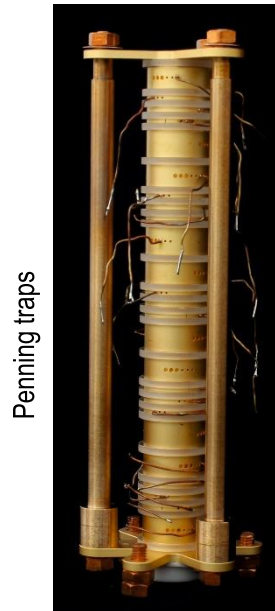
QED TESTS: BINDING ENERGY VIA MASS MEASUREMENT

Idea: Mass measurements of ions in different charge states results in binding energy



$$\Delta E_B = m(U^{91+}) - m(U^{92+}) - m_e$$

Mass measurements in a Penning trap with $\delta m/m \approx 10^{-12}$



Penning traps

Cyclotron frequency:

$$\omega_c = \frac{qB}{m}$$

Strong homogeneous magnetic field



ARTEMIS magnet



$$E = mc^2$$

1s binding energy
in H-like U^{91+}

< 1 eV precision:

Isotope shift
Nuclear properties
2nd order QED

Current best precision with storage rings ≈ 5 eV

Heisenberg Grant: Control of Extreme Ultraviolet Light Fields for Imaging at Ultrafast and Ultrasmall Scales

Dr. Jan Rothhardt



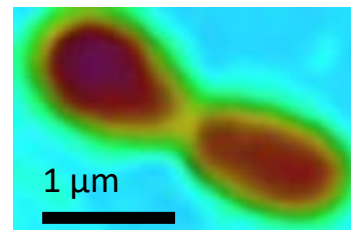
5 years duration
~600 k€ budget

Project goal:

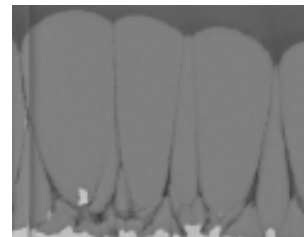
Fundamental understanding of EUV propagation in nanostructures and applications in EUV nanoscale imaging

Broad impact:

Biology & medicine



Material science



EUV optics in science & industry



- Introduction to the Institute
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- Summary

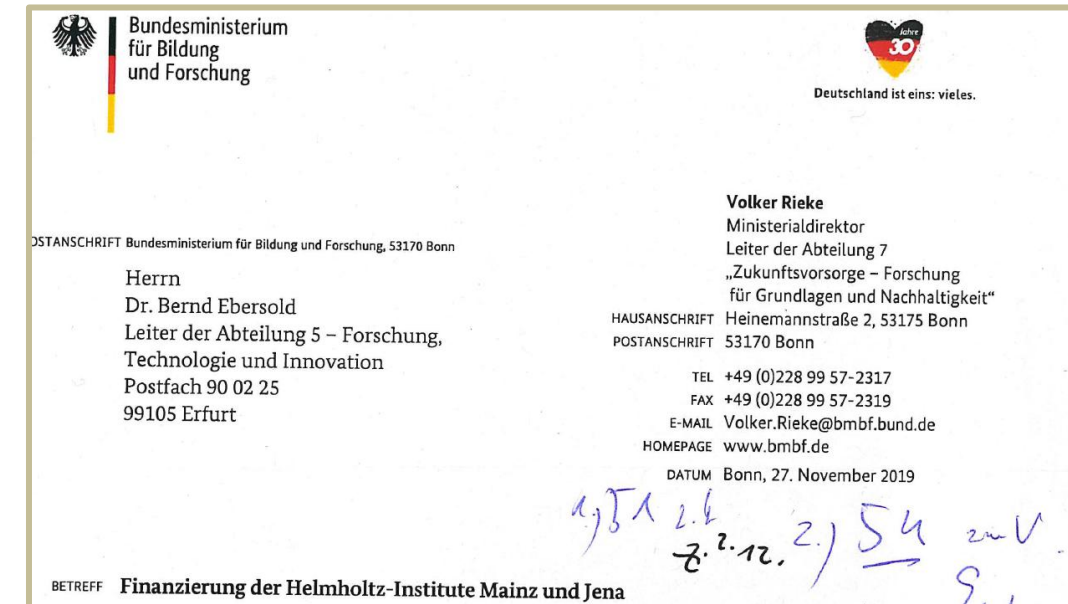
POF IV: BASE BUDGET OF HI-JENA

POF III (K€)

2015	2016	2017	2018	2019
5681	5681	5752	5928	6109

Budget 2020 k€

6,489



POF IV (K€) [annual increase of 2%]

2021	2022	2023	2024	2025	2026	2027
6619	6751	6886	7024	7164	7306	7455

Center GSI has received substantial additional for the years 2020 to 2025
=> GSI has been exempted from the annual budget increase for POF IV.

POF IV: Aufsichtsrat of GSI has agreed on an annual increase of the based budget for both Institutes at Jena and Mainz by 2%.

BUDGET OF HI-JENA 2026

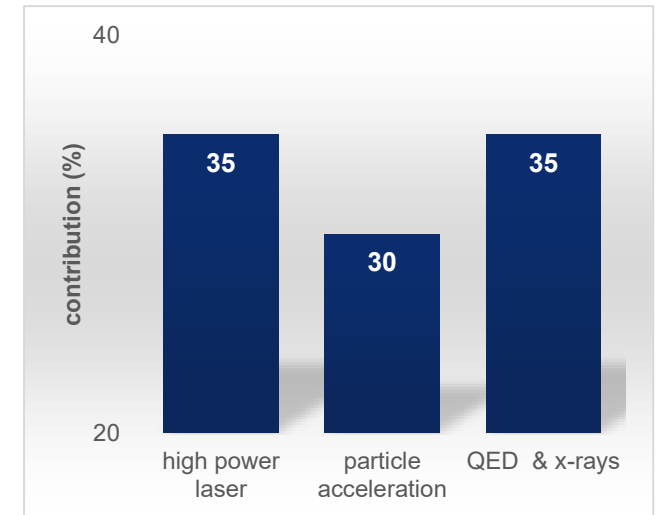
September 2026

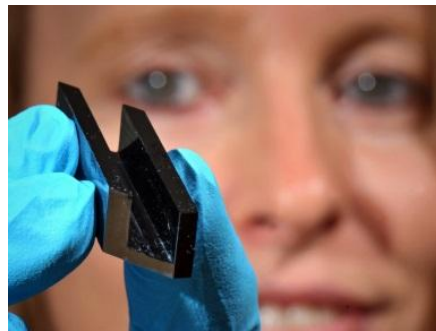
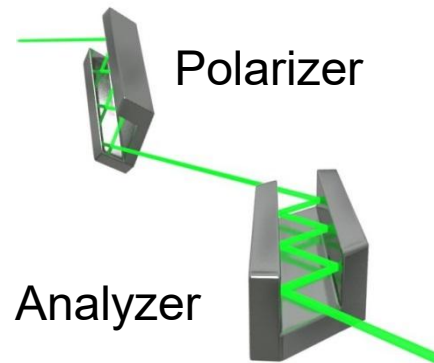
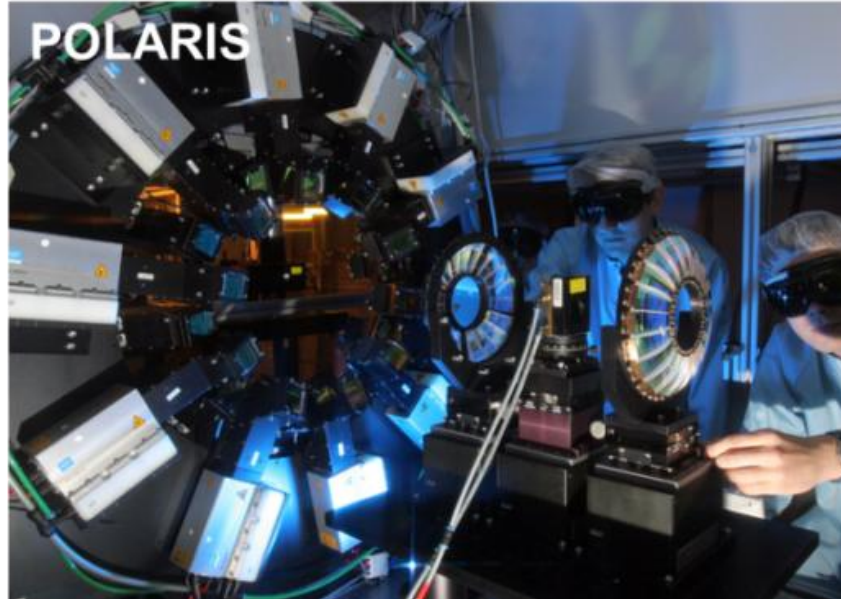
AVAILABLE BUDGET

Position	Value (k€)
Base budget	7,306 k€
Transfer from 2025	657 k€
Special investment Thuringia	144 k€
Sum	8,107 k€

Position	Value (k€)	
Building, Structure Fund, Energy Cost		359
Own contribution (HGF & FSU & TAB)		431
IVF + Overhead		416
Special investment Thuringia		144
Salaries incl. W3 (incl. costs from 2025 130 k€)		5,586
Graduate School		100
High power laser	Budget 2026	375
Particle acceleration	Budget 2026	321
Photon & particle spectroscopy and diagnostics	Budget 2026	375
	Sum	8,107

Distribution of the resources invest and consumables





- 11 (+5 3rd party) Postdocs
- 12 Scientists
- 1 (+2) Young Investigator
- 25 (+28 3rd party) PhD Students
- 6 Support personnel (workshops)
- 5 Administration
- 5 Professors

3rd party (2026) / IVF & Additional Funding

Year	k€
2020	2129 (2697)
2021	898 (1596)
2022	623 (1350)
2023	1167 (1415)
2024	1811 (1894)
2025	2330 (2383)
2026	2142 (2195)

Activity	k€
HGF Co-Creation	369
HGF YIG Micke	154
HGF YIG Schüssler	167
TAB FGI, VDY, DIHP	856
TAB FGR	247
ERC Stöhlker	250
HGF GROOVY, Semantic X-Lab, EMA EUV, C.LEO.PATRA	80
Lasers4EU	19
(Innovationspool)	(53)
Sum	2142 (2195)

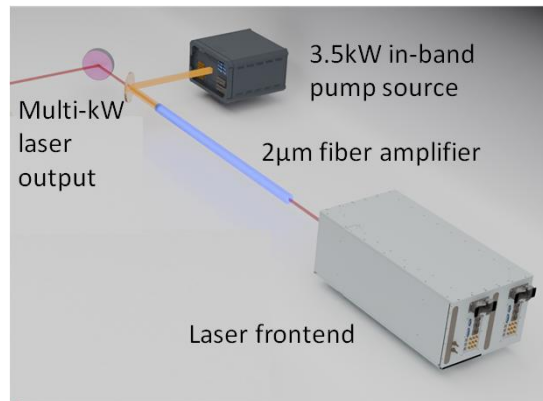


THIRD PARTY FUNDING: EFRE/THURINGIA INFRASTRUCTURE FUNDING

Two projects evaluated and recommended for funding

Announced on 21 September

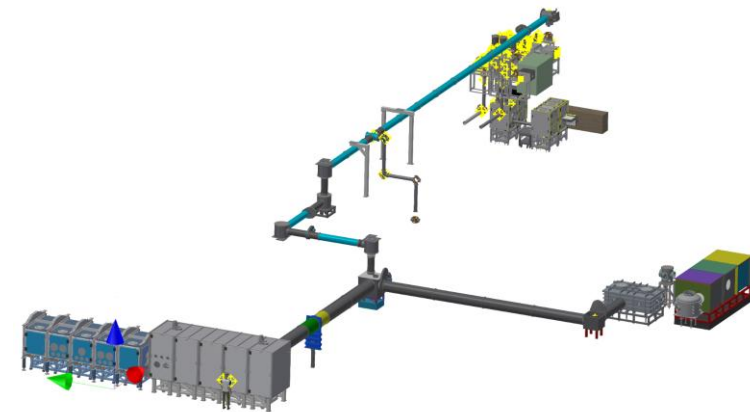
HIGH-POWER PUMP SOURCES FOR 'IN-BAND'-PUMPED THULIUM LASERS (HIT)



Procurement of 3.5 kW in-band pump sources for 2 µm laser systems

Funding of 720 K€

IMPLEMENTATION OF A MULTI-BEAM HIGH POWER LASER INFRASTRUCTURE



Funding for beamlines and vacuum systems linking the POLARIS and JETi200 lasers to the joint Target Area Fraunhofer

Funding of 765 K€



Kofinanziert von der
Europäischen Union



Europa stärkt Thüringen
Förderperiode 2021–2027

Freistaat
Thüringen

Ministerium
für Wirtschaft, Wissenschaft
und Digitale Gesellschaft

PAKT RESOURCES FUSION

Helmholtz Matter

Sebastian M. Schmidt · Vizepräsident



GSI Helmholtzzentrum für Schwerionenforschung



FUSION IN HELMHOLTZ MATTER

FEOPT: TECHNOLOGIES FOR FUSION ENERGY AND FRONTIERS OF OPTICS

- bundling leading technological competencies with focus on technologies relevant for optics and laser fusion, e.g. high-energy, high-average-power laser systems/sources, X-ray optics, diagnostics, and simulation
- a central platform for strong networking – within Helmholtz Matter and beyond
- clear interfaces with strategic anchor subtopics (MT) and key research topics (MML)
- planned close, strategic alignment with Helmholtz Energy, industry, and international partners

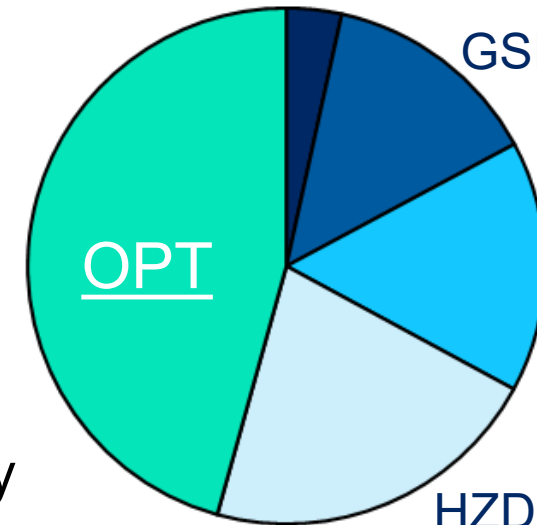
FE: Fusion Energy

KIT: 6%

GSI/Hi-Jena: 25%

DESY: 29%

HZDR: 40%



OPT: 46%

FE: 54%

about 19.770 K€

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JENA EXPERIMENTAL SPACE FOR KNOWLEDGE TRANSFER AND COLLABORATION IN PHOTONICS

HI JENA
Helmholtz-Institut Jena



jETZT Jenaer Experimentierraum
für Transfer und Zusammenarbeit in der Photonik

Partner:



FRIEDRICH-SCHILLER-
UNIVERSITÄT
JENA

Freistaat
Thüringen



Ministerium
für Bildung,
Wissenschaft und Kultur

HI JENA
HELMHOLTZ
Helmholtz-Institut Jena



Fraunhofer
IOF

Leibniz **ipht**
LEIBNIZ-INSTITUT für
PHOTONISCHE TECHNOLOGIEN

Project information

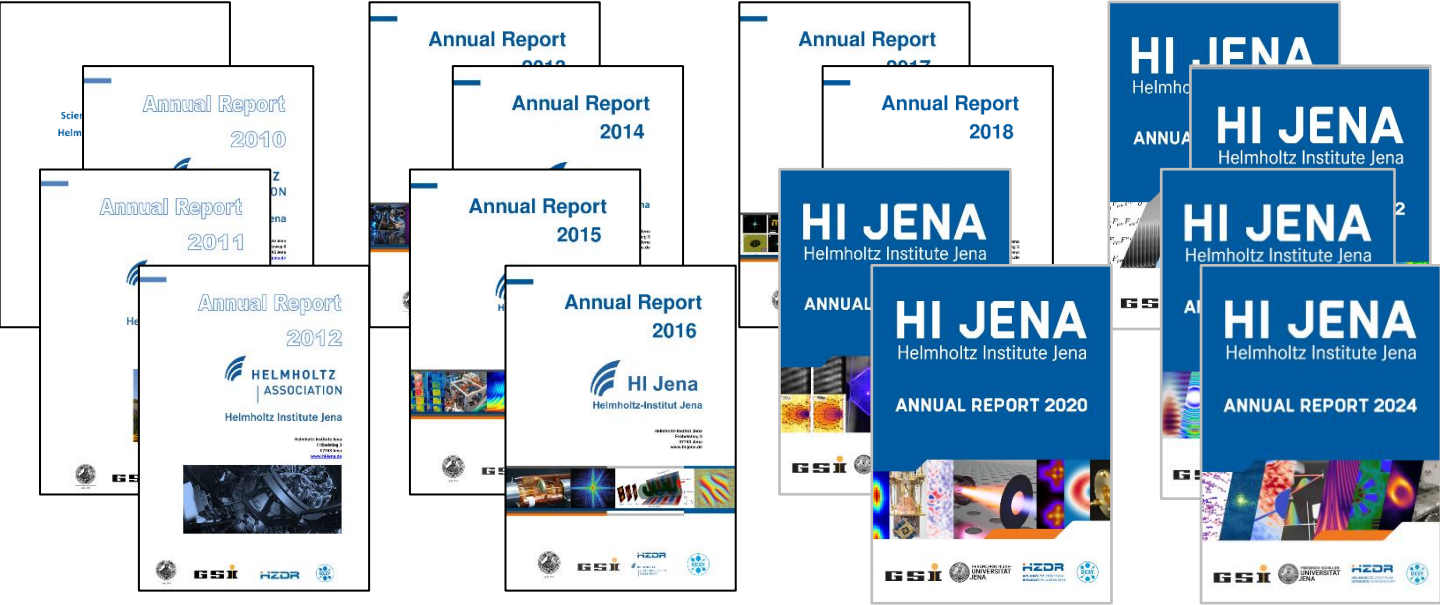
- Duration: 01.07.2026 – 30.06.2031
- Funding amount: 550.000 €
- Profile section: Wissen über Wissen
Funding Initiative: Impulse für das
Wissenschaftssystem

Project management:

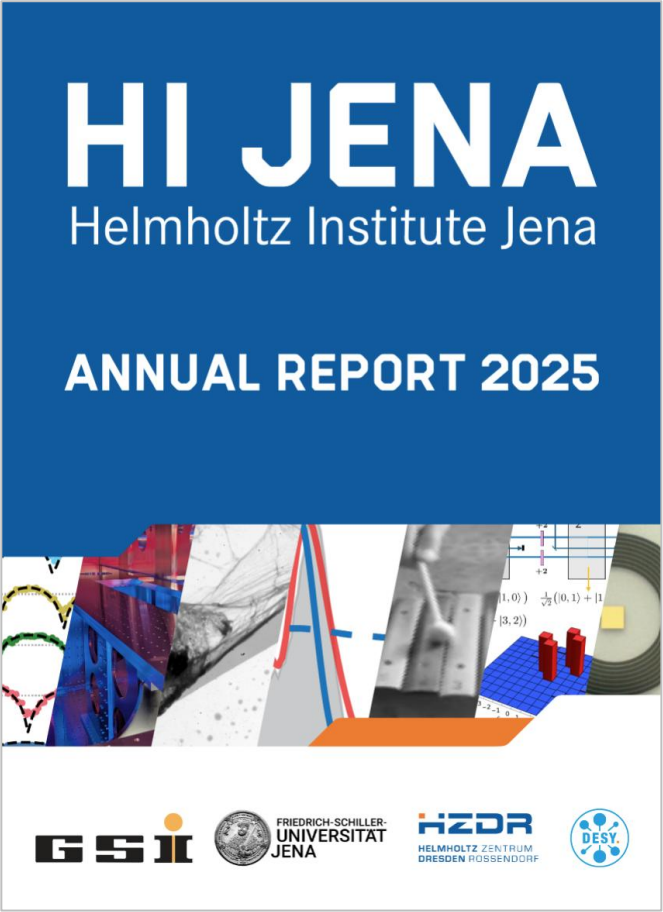
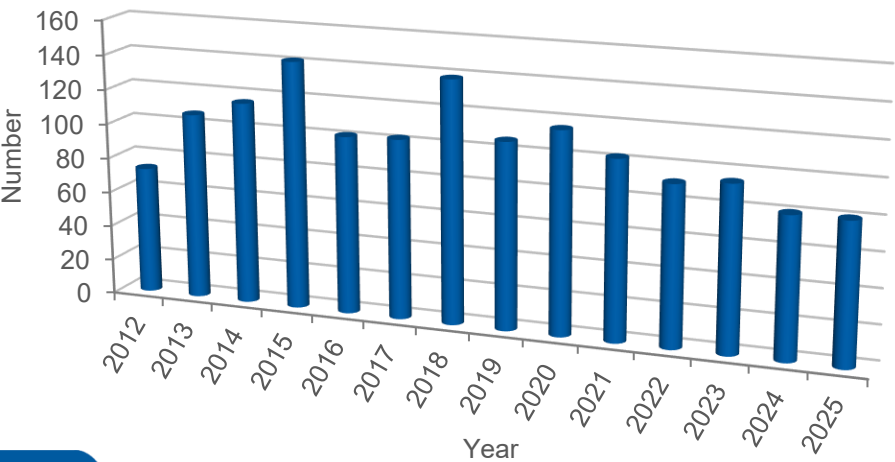
- Prof. Dr. Thomas Pertsch
Friedrich-Schiller-Universität Jena
- Andre Störr
Thuringian Ministry of Education,
Science, and Culture

Opportunities and Obstacles in Scientific Collaboration

- A future-oriented realignment of Germany as a hub for science and business requires strengthening the entire innovation chain—from basic research to applied development.
 - Collaboration within the scientific system offers opportunities for excellence, efficiency, innovation, and knowledge transfer.
- 
- Staff rotation at levels below professorships and department chairs
 - Shared use of infrastructure
 - Strengthening the Berlin model
 - Universities' ability to collaborate



Publications

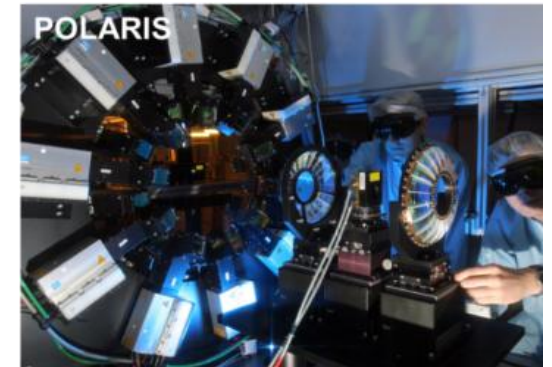


<https://dx.doi.org/10.15120/GSI-2026-00759>
<https://repository.gsi.de/record/368786>

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SUMMARY

- Strategic evaluation for POV V was quite challenging but went very well.
- HI-Jena appears well positioned with regard to the Hightech Agenda and related new initiatives of the research field Matter (e.g, FEOPT).
- Successful acquisition of 3rd party funding for Institute's research infrastructure continues. Again, significant additional funding received from ERDF/Thuringia.
- Promotion of young scientists is progressing well.
- Graduate School: Number of participating students stays constant on a high level (in particular due to 3rd party funding).
- The situation at GSI/FAIR is a real challenge for our HYIG at HITRAP. But they/we will manage this.





Thank you for your attention !