

FIAS – Status and Strategy

E Elsen

FIAS Scientific Advisory Board, March 13-14, 2024

FIAS SAB Membership

Frankfurt

- Prof. Dr. Ulrich Achatz
- Prof. Dr. Volker Dötsch (Chair)
- Prof. Dr. Owe Philipsen

External

- Prof. Dr. Alberta Bonanni
- Prof. Dr. Edda Klipp
- PD Dr. Aneta Koseska
- Dr. Luciano Musa
- Prof. Dr. Reinhard Schneider
- Prof. Dr. Arndt von Haeseler

Thanks for helping us with
your assessment.

Agenda

4 topics

Time to discuss

WEDNESDAY, 13 MARCH	
12:30 → 13:00	Get together 30m 0.200 A small welcome with a few snacks. This is a chance for SAB members to get to know each other
13:00 → 13:20	Welcome and FIAS Overview 20m 0.100 FIAS overview and strategic focus by Eckhard Elsen, Scientific Director Speaker: Eckhard Elsen (FIAS) FIAS Strate...
13:30 → 13:50	Life Sciences 20m 0.100 Speaker: Roberto Covino (FIAS) FIAS_SAB_...
13:50 → 14:10	Neuroscience 20m 0.100 Speaker: Gemma Roig (Goethe University) FIAS_PPT_...
14:10 → 14:30	Scientific Computing 20m 0.100 Speaker: Volker Lindenstruth (FIAS) FIAS_SAB_...
14:30 → 14:50	Physics 20m 0.100 Speaker: Luciano Rezzolla (FIAS and GU ITP) FIAS_Physi... FIAS_Physi...
14:50 → 15:00	Coffee break 10m 0.200
15:00 → 16:30	Round Table 1h 30m 0.100 for further discussion with all FIAS Fellows. Coffee will be served.
16:30 → 18:00	Poster Session 1h 30m Faculty Club (top flo... by FIAS students
18:00 → 18:30	Discussion with FIAS Director 30m 0.101
19:00 → 22:00	Dinner for SAB members 3h external Taxi will be ordered

THURSDAY, 14 MARCH	
08:45 → 09:00	Coffee & Croissants for SAB members 15m 0.200
09:00 → 09:30	Internal Session SAB 30m 0.200 SAB and requested invitees.
09:30 → 10:30	FIAS Administration & Public Relations & Graduate Program 1h 0.100
10:30 → 12:00	1:1 Discussions 1h 30m 0.100 with administrative staff, IT, PhD representatives or PhD students, or FIAS fellows
12:00 → 13:00	Lunch 1h Faculty Club (top flo...
13:00 → 14:30	SAB Discussion (closed session) 1h 30m Faculty Club (top flo...
14:30 → 15:00	Feedback round 30m Faculty Club (top flo...

Questions for clarification?

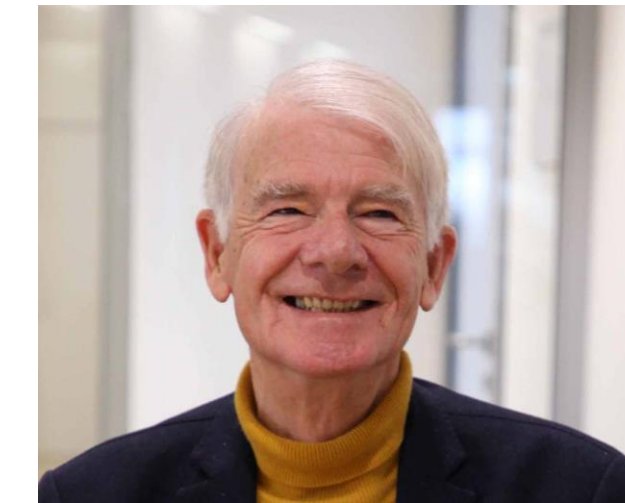
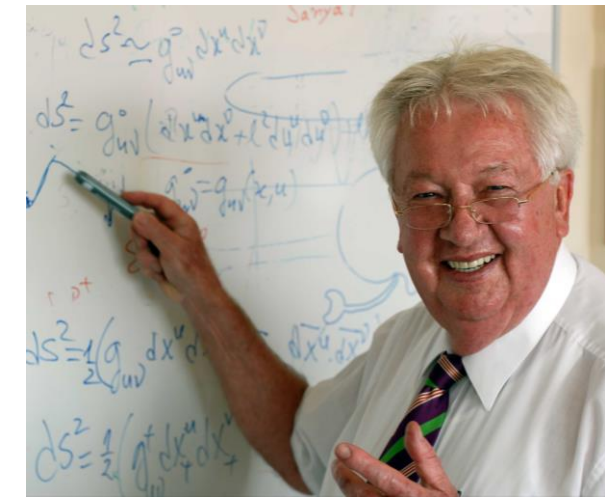
FIAS SAB report

Brief introduction to FIAS

20 Years of FIAS

FIAS

- founded in 2004
 - Walter Greiner (Theoretical Physics)
 - Wolf Singer (Neuroscience)
 - Rudolf Steinberg (President GU)



with the mission to support theoretical natural science

- Relocation to new FIAS building (Giersch Foundation) in 2007
- New „constitution“ instigated by Board of Trustees (Stiftungsrat) in 2022
 - „lean management“
 - Change in funding structure

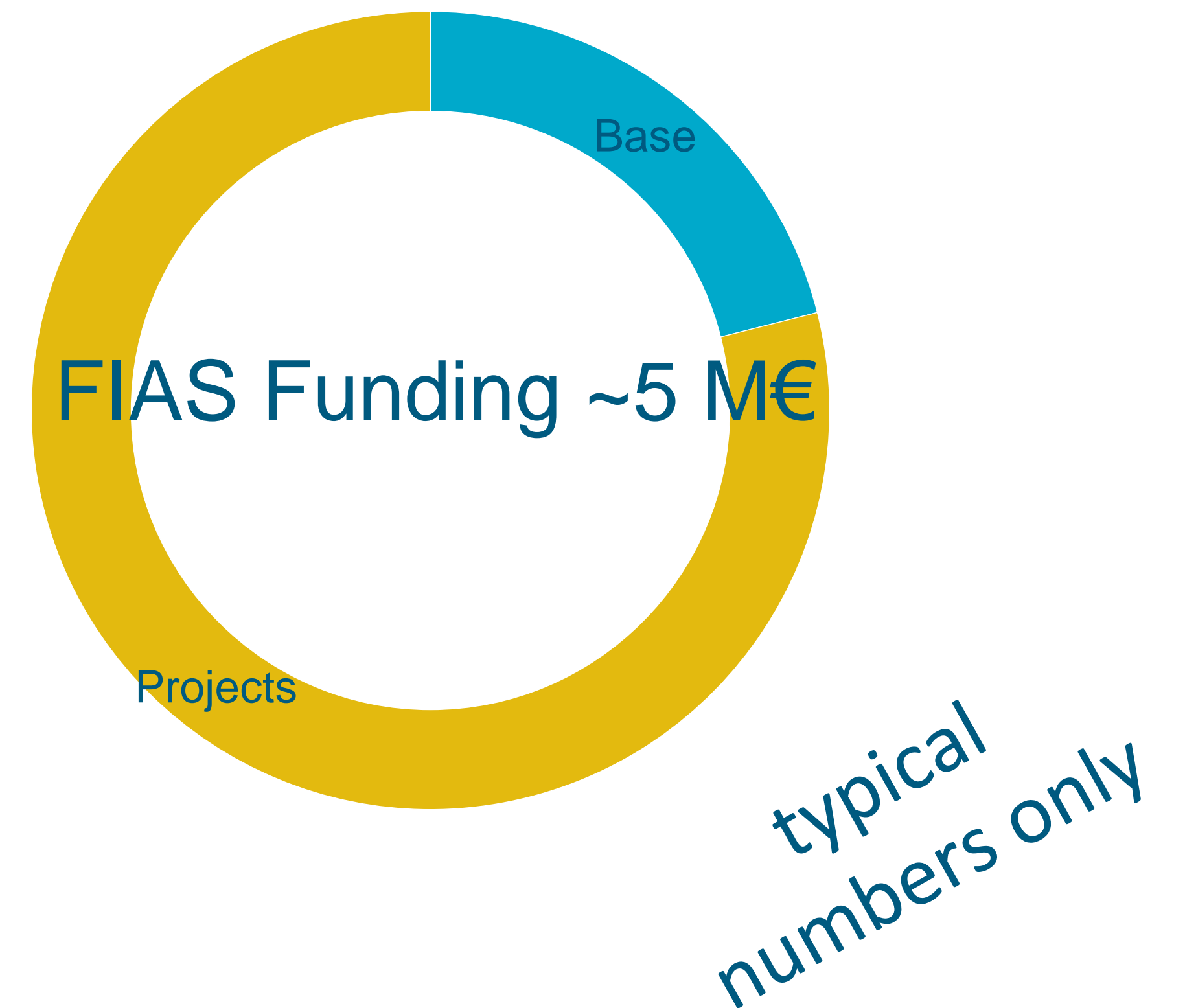
FIAS Finances – qualitatively

Base funding is provided by Goethe University. It covers

- rent
- infrastructure maintenance
- salaries of administration
- ...

Project funding

- DFG, Helmholtz, EU, etc.
- donations



Finances

After reorganisation

- FIAS almost entirely relies on grants to carry out research
- Fixed cost (rent and services) are covered by base funding from university
- Small residual assets are not recurring and need to be carefully targeted including
 - risk management
 - inflation
 - salary increases on endowments

~500 k€



Positioning FIAS scientifically

Positioning FIAS scientifically

Given the Funding situation

- FIAS has to set itself apart from a university institute

FIAS holds a privileged position in the Frankfurt science landscape with

- Goethe University
- Max Planck Institutes
- Helmholtz Centres and Institutes
- Leibniz Institutes
- Private Research Institutions

Identifying (future) Scientific Topics

Faculty of Senior Fellows serves as the advisory body of the director

- Proposals for new projects are guided by ongoing projects and follow-up projects
- No established mechanism to seize new opportunities

Unsurprisingly the search for a consistent portfolio has been slow

- Stiftungsrat has been very helpful and demanding

FIAS Faculty

H Elfner

M L Hansmann

G Hummer

M Kaschube

U Kepschull

V Lindenstruth

L Rezzolla

W Singer

H Stöcker

J Triesch

P Wild

An aside – DFG Excellence Strategy for Universities

Competition of German Universities

- Additional funding for
 - specific topics (EXC)
 - Universities (EXU)



Clusters of Excellence (EXC)

The **Clusters of Excellence** funding line is designed to support project-based funding in internationally competitive fields of research at universities or university consortia. The DFG is responsible for developing and implementing this funding line and for publishing calls for proposals every 7 years. Proposals are reviewed and decided on in an academically driven, competitive process. New initiatives go through a draft proposal and full proposal phase. In the first funding period (1 January 2019 to 31 December 2025) a total of 57 Clusters are being funded with an annual budget of 385 Mio. Euro. In the second funding period (1 January 2026 to 31 December 2032) up to 70 Clusters of Excellence can be funded with an annual budget of 539 Mio. Euro.

- [Information on the Funding Line Cluster of Excellence \(EXC\)](#) →

Universities of Excellence (EXU)

The **Universities of Excellence** funding line serves to strengthen universities as individual institutions or as university consortia in the long term and further develop their leading international role based on successful Clusters of Excellence. The German Council of Science and Humanities is responsible for developing and implementing this funding line. In the first funding period (2019 to 2026) ten Universities of Excellence and one University Consortium of Excellence are being funded with 148 Mio Euro annually. In the second funding period (2027 to 2033) up to four additional Universities or University Consortia of Excellence may receive funding.

The next call for draft proposals for the second competition phase is expected to be issued in 2024.

- [Information on the Funding Line Universities of Excellence \(EXU\)](#) →

FIAS Participation in DFG Excellence Initiative

EMTHERA – Frankfurt and Mainz

- excellent support by R Covino, V Satagopam

ELEMENTS – Frankfurt and Darmstadt

- L Rezzolla, H Elfner and S Nissanke

SCALE – Frankfurt

- R Covino, G Hummer, F Matthäus, S Thallmair, T Sokolowski, V Lindenstruth

The Adaptive Mind (TAM) – Darmstadt, Gießen, Marburg

- J Triesch and G Roig

No invitation for full application

recent news from DFG

Invited to full application

Ongoing and future topics at FIAS

Thematic Opportunities

Life Science and Biophysics

- SCALE
- Multi-scale modelling of biological systems (CMMS)
- Computational bio-medicine

SCALE

Neuroscience

- Multi-scale modelling of neural systems
- The Adaptive Mind (TAM),
Consciousness (LOEWE)

TAM

Scientific Computing

- sustainable computing through architectures and algorithms

NHR initiative

Thematic Opportunities cont'd

Physics

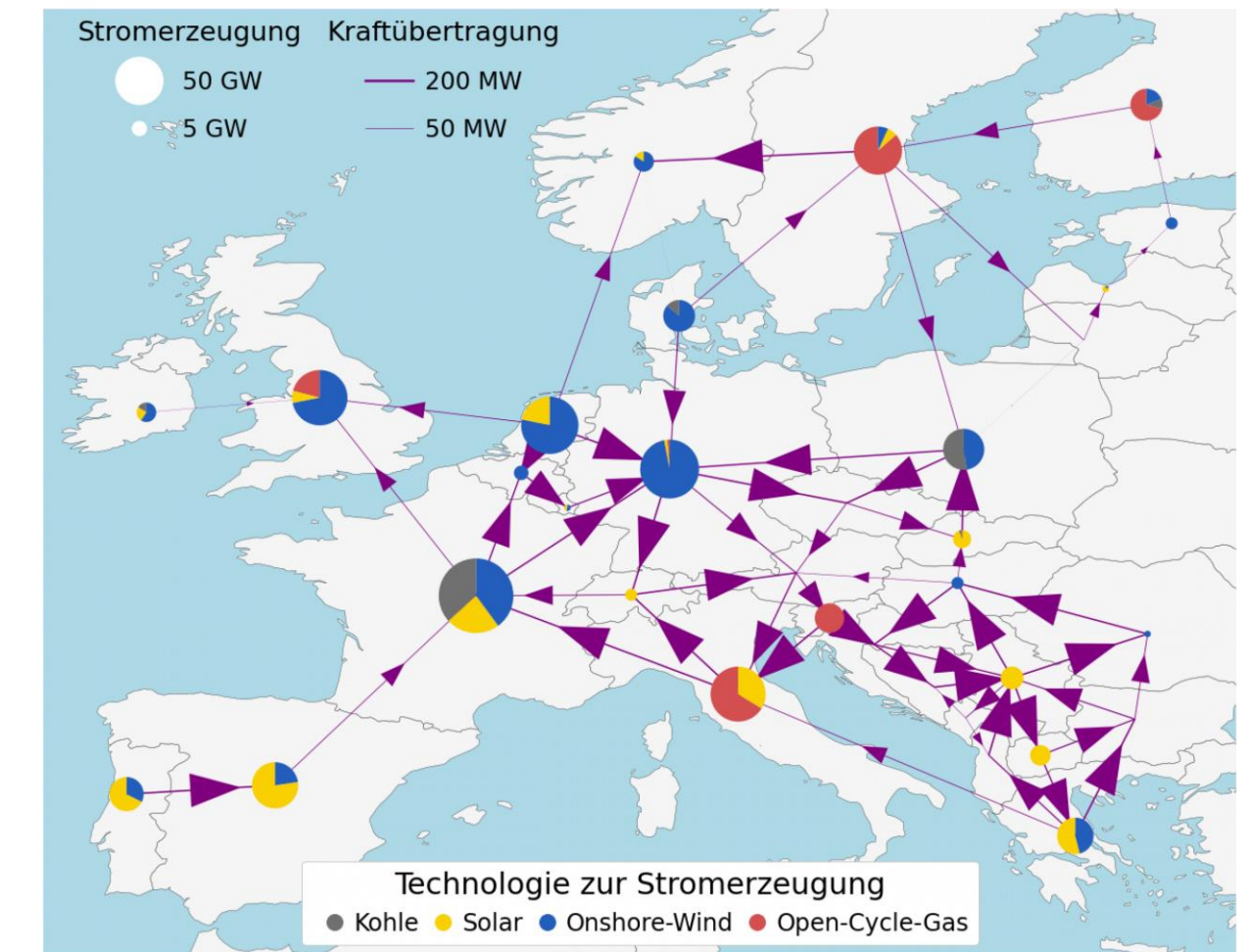
- **Dense nuclear matter**
 - Heavy ion collisions, EOS in nuclear matter
- **Gravitation**
 - Expand topic jointly with university
- **Quantum**
 - Theoretical exploration at FIAS to complement hardware initiative at GU, i.e. quantum computer installation (T Lippert et al.)
 - Engagement in initiatives (Open Quantum Initiative Geneva)

Thematic Opportunities: Sustainability

Environmental topics

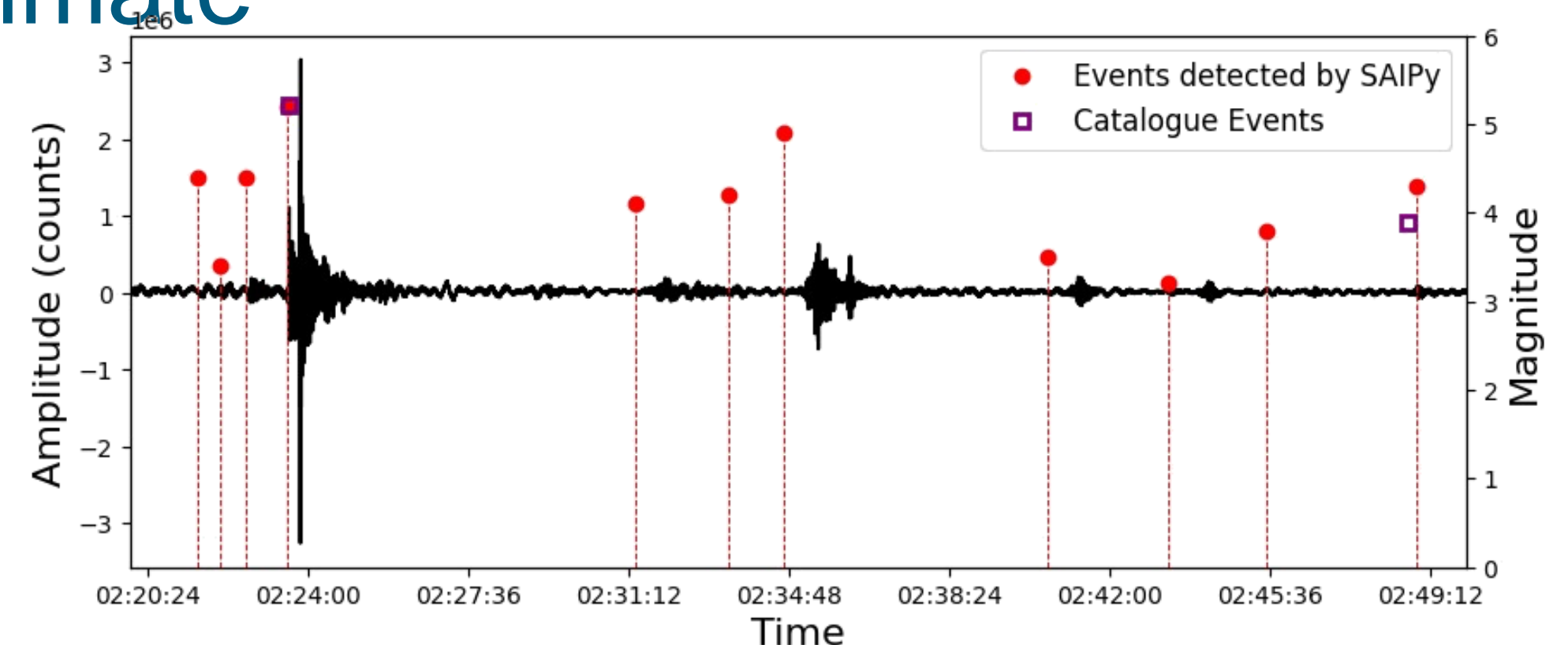
- Structure of Lightnings
- Electricity network operation with widely distributed sources

Application of AI methods



- volcano eruptions, tsunamis, violent climate events

AI tools for swift recognition



Computational Biomedicine and Therapeutics

Computational tools for biological and translational research

- responsible use of approaches from AI
- multi-scale modelling
- complex and diverse data integration and interpretation, standardisation, and ethical and legal considerations.

Existing collaboration with University of Luxemburg

- Studies on a limited cohort sets an excellent example

Venkata
Satagopam



Using the Giersch Conference 2023 for soul searching

Giersch Conference 6.-10.11.2023

Graphics from OpenAI;
generated from abstract



Abstract as synthesis
from discussions

— About

What do the human brain, biological networks, developing organisms, the immune system, flocking birds, AI systems and quantum devices have in common?

All these systems, while vastly different in their appearances, spatial and temporal scales and functions, unfold their dynamics in high-dimensional state spaces. At the same time, external stimuli can condense these complex spaces onto a dramatically smaller subset of states that represent targeted responses to these inputs. Most intriguingly, this subspace may emerge from low-order, often linear interactions and superpositions, which appear to balance the potential of generating arbitrary solutions against processes that filter out apt solutions from all physically possible ones. Ultimately, this enables the emergence of new and meaningful system states seemingly out of nothing.

Impressions

Thanks for organising this conference. I enjoyed it tremendously - it gave a lot of inspiration! And it was all very well organized.

– Pieter Rein ten Wolde (AMOLF Amsterdam)



Emerging conclusion

Common interests

All topics revolve around a common method

- Digital Twin
 - A simulation of reality to a detail that can be interrogated with respect to external stimuli and guide developments and interpretations
 - using
 - theory inspired modelling
 - AI methods for optimisation
- Refine the methods; profit from the progress in neighbouring fields
- Scientific understanding is a vital element

Topics presented today

- Life Sciences – Roberto Covino
- Neuroscience – Gemma Roig
- Scientific Computing – Volker Lindenstruth
- Physics – Luciano Rezzolla

There are many more activities and some will hardly be mentioned. Please refer to Annual Report and Poster Session to learn more on the details.

- We will use the Round Table to discuss and to explore strategic aspects. Please do not hesitate to ask.

Charge to SAB

Roles of FIAS

Identify new and future research topics with high potential

- not yet established in research centres or universities
- avail themselves for rapid implementation and test
 - transferrable to research centres and universities once successful
- suitable for attracting funds or donations in order to finance themselves

Attract high level researchers temporarily – sabbatical, detailed studies

Collaboration with GU and other research centres

Foster international collaboration

Charge – your comments to:

Are we fulfilling these roles?

- Selection of topics
 - New opportunities
- Comments on available expertise
 - Fellows
 - Topics

Management approach

- Establish themes before acquiring grants
 - Less (thematic breadth) may be more – in establishing the FIAS brand



Strategic evaluation

Thank you!