



GLOW member Institute representatives:

short update on current activities



Hermann Heßling, Dominik Schwarz, Ralf-Jürgen Dettmar, Frank Bertoldi, Olaf Wucknitz, Dominik Elsässer, Benedetta Ciardi, Marcus Brüggen, Olaf Mextorf, Joe Mohr, Christian Vocks, Matthias Hoeft, Matthias Kadler



Berlin's largest university of applied sciences

14,000
students

75
study programmes

2017: Symposium "Big Data made in Germany" @ HTW Berlin

2018: Member of GLOW Consortium

2018: Workshop "Exascale Data Center" @ HTW Berlin

2018: Workshop "Memory-driven Computing" @ HTW Berlin

2019: Verein für datenintensive Radioastronomie (VdR)

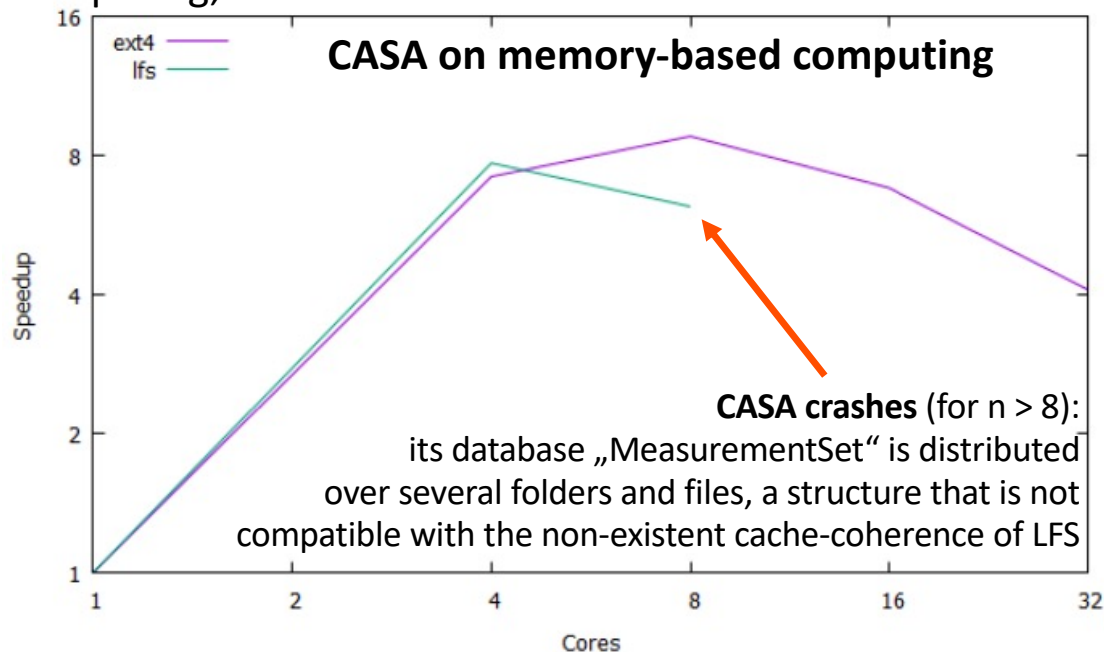
2021: Co-applicant of consortium PUNCH4NFDI

2021: Steering group Deutsches Zentrum für Astrophysik (DZA)

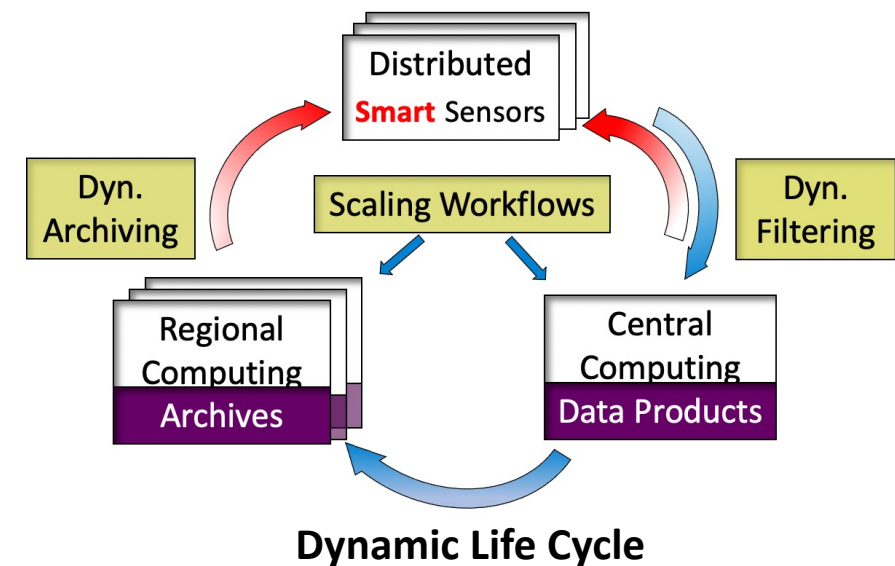
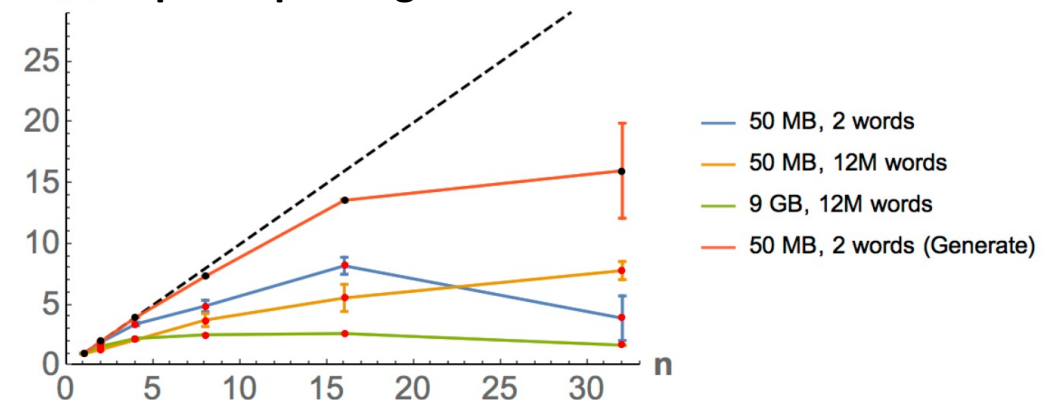


H. Heßling et al.: On Divide and Conquer in Image Processing of Data Monster, Big Data Research **25** (2021) 100214

H. Heßling, M. Kramer, S. Wagner: Next-generation Green Computing, EGI Conference 2021



S(n) Speedup of Big Data Tool Thrill



Report from Bielefeld University

GLOW Council 2021

Two groups work on radio astronomy:

Pulsar Astronomy

Cosmology and Astroparticle Physics

Co-operate LOFAR station DE609

Operate GLOW storage and compute cluster @ FZ Jülich

Personell

- **Mayumi Sato** joined as the new project coordinator of D-MeerKAT-II (works on project coordination, beam model of SKA-MPG telescope, and VLBI)
- **Ahmed Ayad** joined as a postdoc (works on axion and ALP detection with radio telescopes)
- **Yuko Urakawa** became associated professor at KEK, Japan
- **Jörn Kunsemöller** is now on a permanent position (works on TMSS and PUNCH4NFDI data lake, and administrates GLOW storage & compute cluster)
- **Thilo Siewert** graduated with PhD thesis on *Testing the foundations of cosmology with the radio sky*
- **Jun Wang** graduated with PhD thesis on *Optimizing Analysis Standards for Pulsar Timing Arrays and Gravitational Wave Detection*

Existing & New Initiatives

- D-LOFAR2.0 (ErUM-Pro)
- D-MeerKAT-II (ErUM-Pro)
- LOFAR4SW (Horizon Europe)
- **PUNCH4NFDI (DFG)**
(TA2 Data infrastructure + TA5 Data irreversibility)
POSTDOC position to be announced (contact DS)
- **Profilbildung 2020 (NRW MKW)**
NRW-Cluster: Big Bang to Big Data (B3D)
POSTDOC position to be announced (contact DS)
- **CRC-TR 211 Strong interaction matter under extreme conditions (DFG)**
2nd funding period
(includes looking for QCD axions by means of radio astronomy and understanding the physics of neutron stars)
- RTG 1620 Models of Gravity (DFG)

Ralf-Jürgen Dettmar

LOFAR Station DE605: improvements for local RFI under study

LTA: hardware funded by BMBF/VBF is ordered

LOFAR2.0: funding for station upgrade by BMBF/VBF shifted to 2023

Science: Several projects based on LoTSS making progress

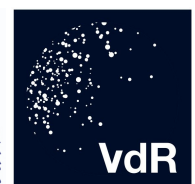
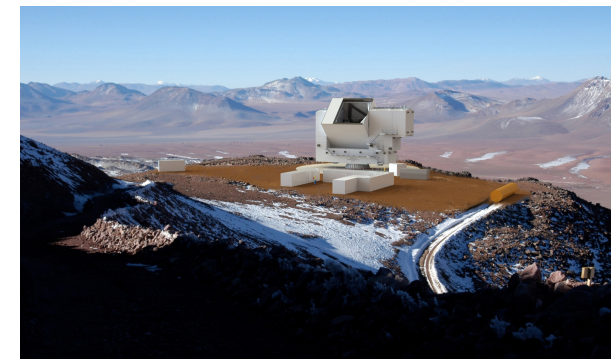
Education: Bachelor and Master-Theses based on LOFAR data

Personal: Position available



Relevant activities:

- **ALMA:** German node of the European ALMA Regional Center (ARC), cooperation btw. Bonn and Cologne (Bertoldi and Schilke groups) continue user support and development of tools for ALMA data analysis.
- **CCAT-prime** project: Telescope renamed to *Fred Young Submillimeter Telescope* (FYST, pronounced like “feast”) cooperation Bonn, Cologne, MPA (Bertoldi, Stutzki, Komatsu) with Cornell U. and Canadian Universities. Additional partner still welcome (>3 M€).
Status: Telescope (by Vertex) and infrastructure under construction, completion by end 2023.
- **Big Bang to Big Data (B3D):** start of a 3-year infrastructure development cluster supported by NRW for data science in radioastronomy. Other partners: MPIfR, U. zu Köln, FZ Jülich, H-Bonn Rhein-Sieg, U Bielefeld, TU Dortmund, RU Bochum.
- **PUNCH4NFDI:** new science data infrastructure for astronomy & particle physics. @Bonn focus on training and outreach.
- **Verein für Datenintensive Radioastronomie e.V. (VdR):** Business office (Geschäftsstelle) to be in Bonn run jointly by AlfA and MPIfR.



Max-Planck-Institut für Radioastronomie (Bonn)

- LOFAR
 - running GLOW mode with Bielefeld
 - ionosphere (Natasha Porayko)
 - pulsar scintillation (Tim Sprenger, Robert Main, Olaf Wucknitz)
 - DE601 will be upgraded to LOFAR2.0
 - flood damage: LBA down until early 2022

- MeerKAT

- built S band receivers (64 installed), commissioning ongoing
- L band survey ca. 40 % complete
- S band survey starts early 2022
- TRAPUM and MeerTIME ongoing, good results
- MeerKAT+: contract signed, add dishes by 2023/24

- SKA

- prototype dish commissioning almost finished
- general agreement between BMBF, MPG, SKAO about German membership, formal steps to come soon

- Effelsberg 100-m telescope
 - fully digital unified backend for all receivers coming
 - UBB receiver version 2 (1.3–5 GHz) expected mid 2022
 - L band PAF (ASKAP type) available
 - CryoPAF (S band) expected 2023
 - plans for 3-band high frequency receiver, low-freq too

Status Update TU Dortmund Experimentelle Physik 5B

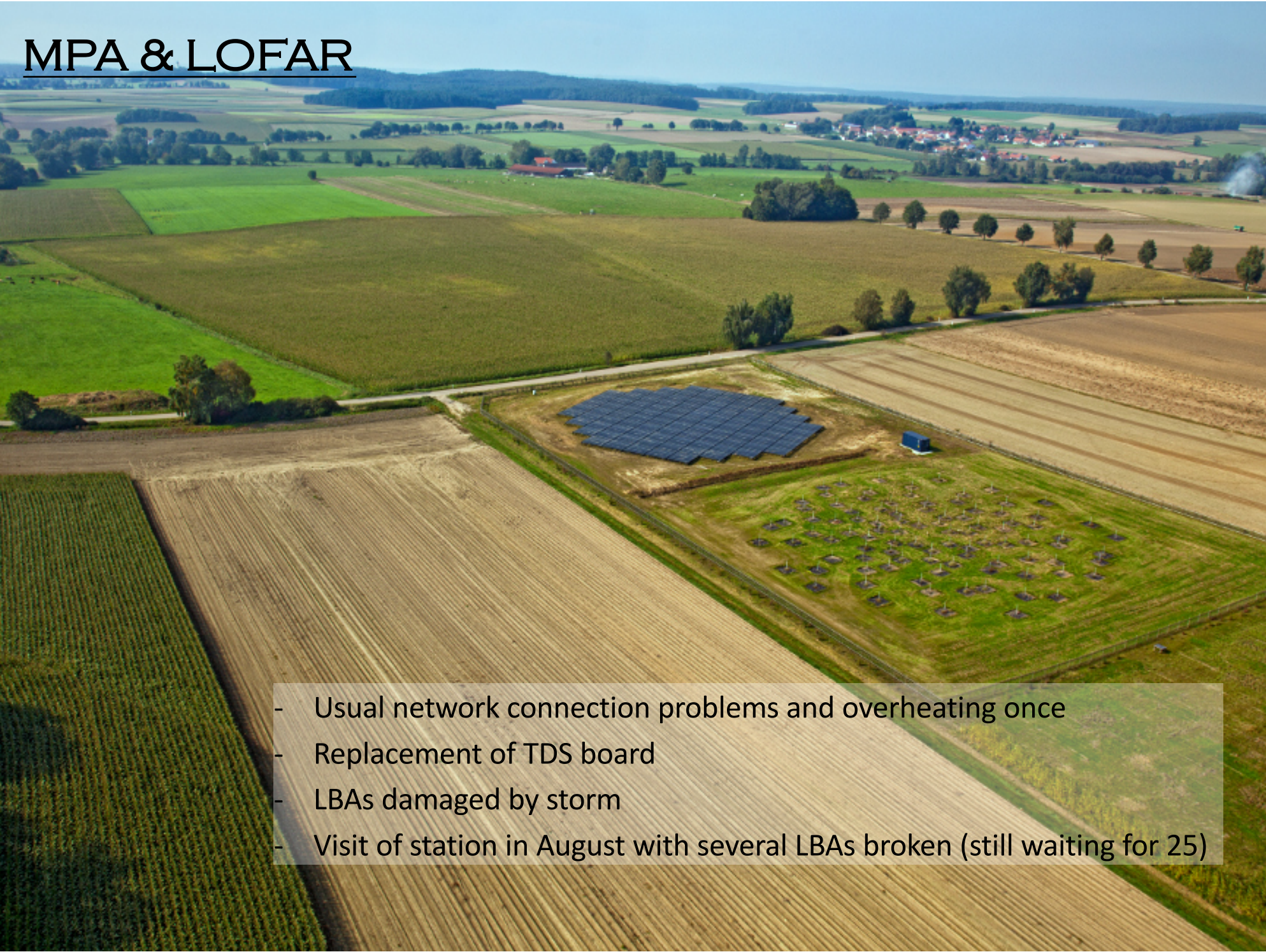
Dominik Elsässer

GLOW Consortium Meeting, Munich, 22.11.2021

Status of the group / Overview of projects

- Multiwavelength/Multimessenger observations and analysis
- D-MeerKAT II: Metadata of the MPG SKA prototype dish
- B3D: Work package on data science
- Methods development: computer vision for VLBI reconstruction
- Future plans: MW dark matter searches

MPA & LOFAR

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- Usual network connection problems and overheating once
 - Replacement of TDS board
 - LBAs damaged by storm
 - Visit of station in August with several LBAs broken (still waiting for 25)

MPA & LOFAR

1. Epoch of Reionization KSP:

Anshuman Acharya

Benedetta Ciardi

2. Surveys KSP:

Torsten Ensslin

Guinevere Kauffmann

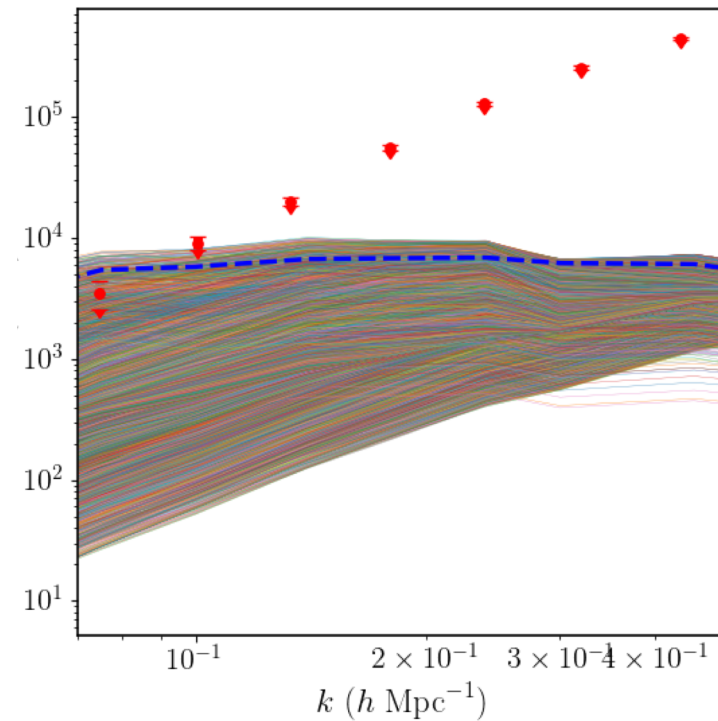
Simon White

3. Magnetism KSP:

Philipp Arras

Torsten Ensslin

Power spectrum at $z \sim 9$ [mK^2]



Ghara+ 2020; Mertens+ 2020

Technical support & station maintainance: Ado Arnolds

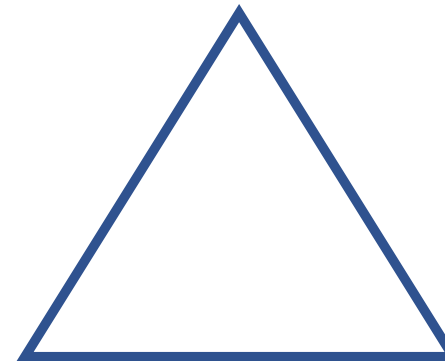
Update University of Hamburg

- Ready to upgrade Norderstedt station to LOFAR 2.0
- Several new faces in our radio astronomy group.

Dr. Volker Heesen
Dr. Virginia Cuciti (AvH)
Dr. Gabriella Di Gennaro (AvH)
Dr. Duy Hoang
Dr. David Rafferty
Dr. Feng Gao

Lovorka Gajovic
Alexander Jones
Thomas Pasini
Giulia Lusetti
Marco Simonte
Henrik Edler
Kathrin Böckmann

Also ML: Dr. Caroline Heneka





FZ-JÜLICH STATION REPORT

Annual Report on FZJ/JSCs contributions to LOFAR/GLOW

22.11.2021, RADIO2021 AND GLOW ASSEMBLY, OLAF MEXTORF (FZJ/JSC)

AREAS OF CONTRIBUTION

- “Hosting” of Jülich antennafield
- Network connectivity for
 - Antennafields-traffic (to Dwingeloo and for GLOW-mode)
 - LTA incoming traffic from NL
 - GLOW-/Meerkat-cluster at Jülich
 - Community access to LTA-data held at Jülich
- Operation of Jülich LTA (server, storage)
- Compute- and storage-ressources offered via well-known application processes

HOSTING OF JÜLICH ANTENNAFIELD

- No major changes to report
 - Operation / environment runs smoothly
- Lease contract of area was prolonged already in 2019 for 12 years
 - No action required until 2030
- The area in front of the antennafield just recently was the set for some action-movie production



„Alarm für Cobra 11“ vor Daubenrather Tor

15. November 2021

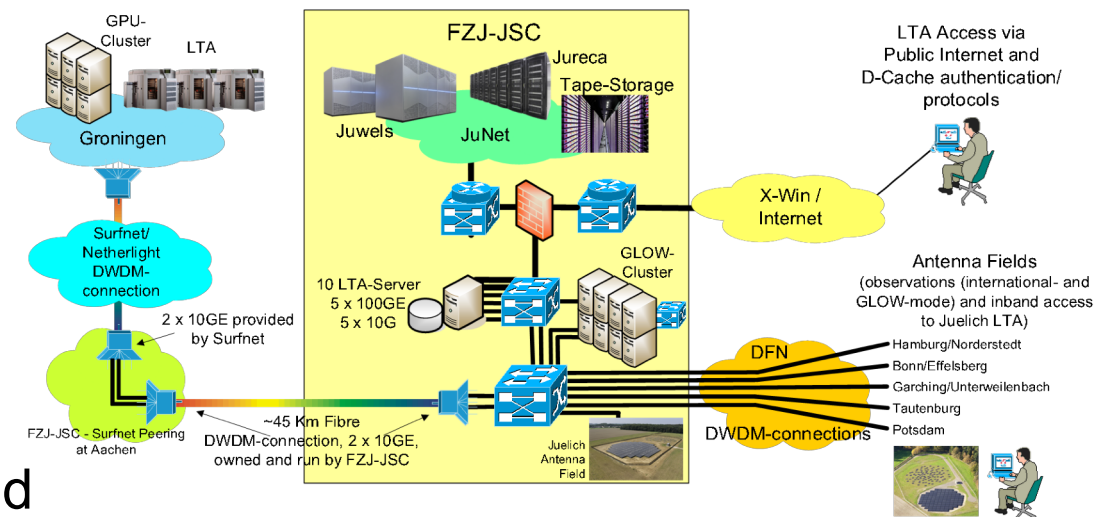
Am Dienstag und Mittwoch, 16. und 17. November, sind „die Männer“ von Cobra 11 „Autoschiebern, Mördern und Erpressern“ wieder auf der Spur. Ihr Einsatzort ist dieses Mal vor den Toren des Forschungszentrums, genauer gesagt auf der Landstraße zwischen Grüner Weg und dem Daubenrather Tor.

Zwischen 9:00 und 11:00 Uhr ist die Zugangsstraße zum Daubenrather Tor daher für Fahrzeuge in kurzen Intervallen gesperrt. Da das Daubenrather Tor jedoch nur von 6:30 bis 8:30 Uhr geöffnet ist, sind für die Mitarbeitenden des Forschungszentrums keine Einschränkungen zu erwarten.



NETWORK CONNECTIVITY

- Connections from German antennastations to Jülich (6 x 10GE) as well as from Jülich to Dwingeloo (2 x 10GE) are running quite well
- Five of Jülich's LTA-servers are connected via 100GE to the network
- Ethernet connectivity for GLOW-cluster was enhanced due to the installation of the Meerkat-part (2nd HY/20)
- More details in my talk



LTA

- 10 LTA pool nodes + some dCache-/Admin-/Download-nodes at JSC
- 5 most data-intensive nodes connected via 100GE
- One node was renewed during the last year
- Presently the procurement of an additional node (via Ruhr-Universität Bochum) is on it's way
- 1.2 PByte of pool-capacity
- Tape IO in 2021 of about 900 TByte in each direction (read and write)
- Responsible: Arpad Miskolczi and Cristina Manzano
- More details in Arpad's talk

COMPUTE RESSOURCES

- End of 2020 the Juwels-cluster system was enhanced by a booster-module
 - 73 Petaflops peak
 - 936 nodes
 - per node
 - 2-socket AMD EPYC Rome
 - 2 x 24 cores
 - 4 x NVIDIA A100 GPU
 - 4 x Infiniband HDR
- Application for compute-cycles via the well-known processes



COMPUTE RESSOURCES

- Juwels Cluster and Booster
 - 12,33 and 73 Petaflops peak
 - Intel XEON and AMD EPYC based
 - 167.696 cores
 - NVIDIA V100, P100 und A100 GPUs available
- Jureca-DC and Booster
 - 18,52 and 5 Petaflops peak
 - AMD EPYC and Intel XEON Phi (Knights Landing) based
 - 209.824 cores
 - NVIDIA A100 GPUs available
- Hybrid Cluster Jusuf (classical cluster and OpenStack-based offer)
 - 944 Teraflops peak
 - AMD EPYC 7742 based
 - 26.240 cores
 - NVIDIA V100 GPUs available



STORAGE RESSOURCES

- Just5 Storage Cluster
 - 22 building-blocks of 2 servers
 - Lenovo x3650 M5
 - Dual socket Intel XEON E5-2690
 - DSS-storage (JBODs)
 - 4 x 100GE per server
 - 81,3 PByte capacity
- Tape-Libraries
 - 2 x STK SL8500 and 1 x TS4500
 - 310 PByte capacity
- Just last week a 2nd library TS4500 was commissioned starting with additional 20 PByte capacity



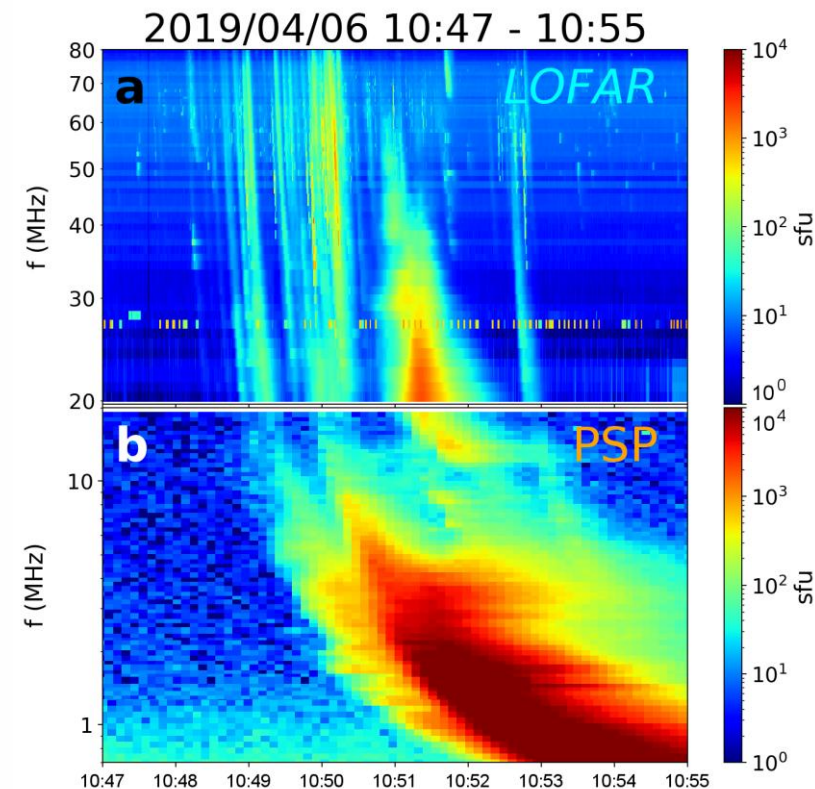
Thank you !

Any questions ?

LOFAR activities at AIP: Sun and Space Weather

Joint observations with Parker Solar Probe and Solar Orbiter

- Solar KSP cycle 16 long-term proposal
- 175 hours each in cycles 16 – 19
- Observing campaigns 3 weeks around PSP and SoO orbit events
- Observations 6h / day around noon
- Combination of interferometric + beam-formed imaging, dynamic spectra, IPS, Faraday rotation
- Study solar activity + space weather from the Sun into the heliosphere
- 26 July – 15 August PSP perihelion observed under this proposal



GLOW @ Thüringer Landessternwarte



DE603 no major issues in last 12 month

Personell

Aritra Basu (MKSP)

Jochen Eislöffel (star formation, TKSP,)

Alexander Drabent (D-LOFAR2.0, SKSP)

Gülay Gürkan

Artie Hatzes (Exoplanets)

Matthias Hoefft (SKSP)

Vijay Mahatma (SKSP)

Mukul Mhaskey

Eleni Vardoulaki

Technical

Ralf Neubert (Station hardware)

Mathias Ball (IT)



GLOW activities @ TLS

operating LOFAR station (no incidents, part of GLOW mode)

D-LOFAR software development (Drabent)

LoTSS data reduction on JUWELS
(Long baselines in preparation)

workstations for LOFAR and MeerKAT cal&img

LOFAR KSPs members:

Surveys, Magnetism, Transients

Collaboration with DLR Institute for Data Science in Jena

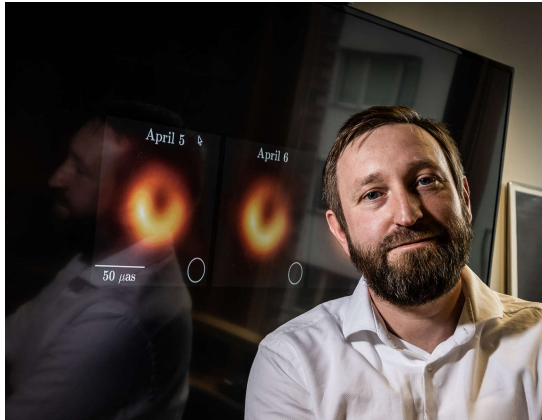
TA2 co-chair 'Data management' in PUNCH4NFDI



GLOW Activities in Würzburg

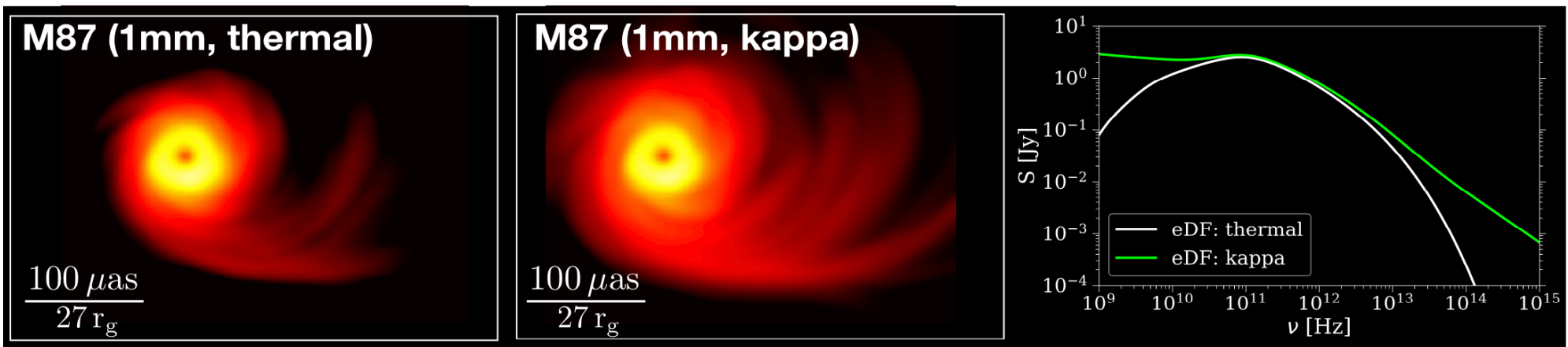
Matthias Kadler

GLOW Annual Assembly, Garching, November 22, 2021



New Working Group

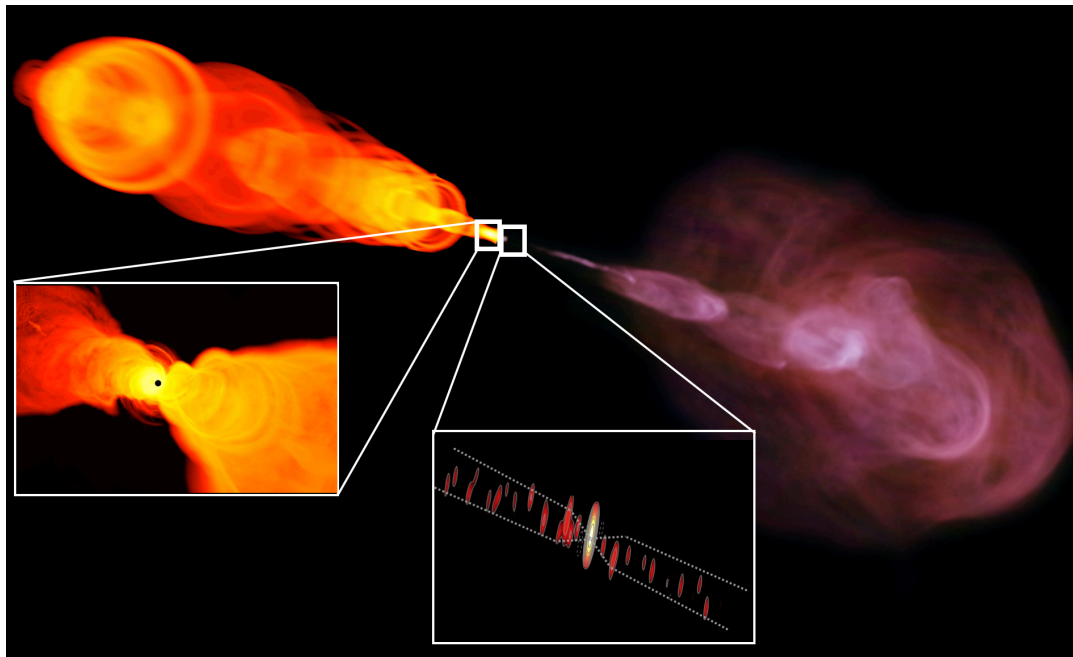
- Christian Fromm: Computational Astrophysics
 - Black Holes, accretion, jet formation
 - EHT, ngEHT: modeling and comparison with observations





DFG Research Unit

- FOR5195: Relativistic jets in active galaxies
 - DFG Approval: July 2021
 - Projects Start: Feb2022
 - New group members: E. Bonnassieux, H. Shetgaonkar



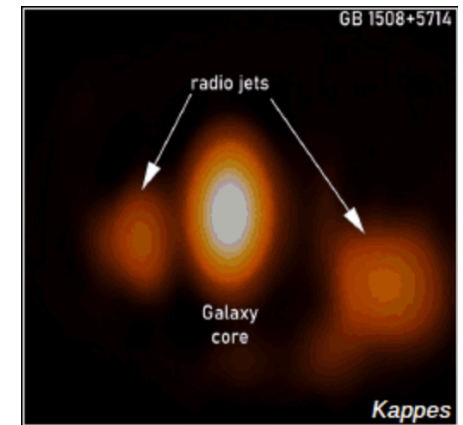
Long-wavelength radio projects

- LOFAR-VLBI observations of X-ray jets (Kadler)
- Large-scale jet feedback (Brüggen, Hamburg; Pfrommer, Potsdam)



LOFAR-VLBI Paper Splash

- The sub-arcsecond view on the high-redshift blazar GB 1508+5714 by the International LOFAR Telescope
- See Talk by A. Kappes tomorrow



Most detailed-ever images of galaxies revealed
using LOFAR