Panel: Future of HPC

Moderator: John Cazes

Dennis Willsch
John Towns
Estela Suarez
Maciej Cytowski

John Cazes – my nutshell

Since 2019	Director of High Performance Computing, Texas Advanced Computing Center
2017-2019	Deputy Director of HPC, TACC
2010-2017	Manager of HPC Applications Group, TACC
2007-2010	Climate/Weather/Ocean Lead, DoD HPCMP, TACC
2005-2007	Climate/Weather/Ocean Specialist, DoD HPCMP, TACC
2001-2005	Principal Analyst, DoD HPCMP, Northrop Grumman/Lockheed Martin
1992-1999	PhD in Physics, Lousiana State University
1990-1992	Masters in Physics, Louisiana Tech University
Research Interests	Advanced architectures, parallel I/O, HPC performance
Background	Astrophysics, Climate/Weather/Ocean failed astrophysicist, Fortran apostle

TACC
TEXAS ADVANCED COMPUTING CENTER

DOD HPC
MODERNIZATION PROGRAM

LSU

LOUISIANA TECH UNIVERSITY

DR. DENNIS WILLSCH

Senior Researcher

- **Since 2023:** Permanent Researcher at JSC
  Lecturer University Appl. Sci. Aachen
- **2020 – 2023:** Postdoctoral Researcher
- **2017 – 2020:** PhD in Physics at RWTH Aachen
- **2011 – 2016:** Bachelor & Master in Physics

Benchmarking gate-based quantum computers

2017: This IBM quantum device does not satisfy the main criteria of a computing device!

Comput. Phys. Commun. 220, 44

Benchmarking the QAOA

2020: The D-Wave quantum annealer works better than QAOA on an ideal simulator!

Quantum Inf. Process. 19, 197

Large-Scale Simulation of Shor's Quantum Factoring Algorithm

2023: Will any quantum device be able to factor a number larger than what we can factor by simulating Shor's algorithm on 2048 GPUs?

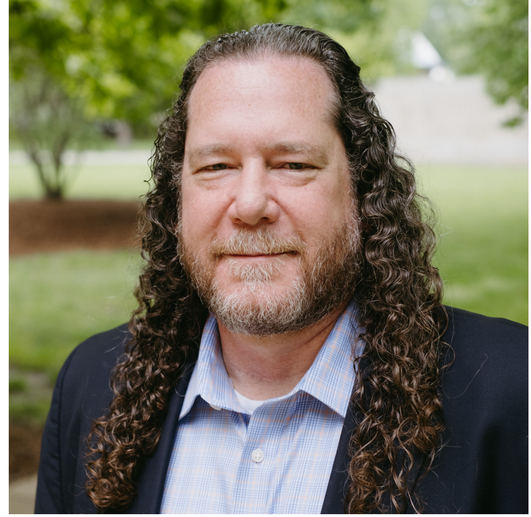
Mathematics 11, 4222

Observation of Josephson harmonics in tunnel junctions

2024: Superconducting QPUs face a huge fundamental challenge!

Nat. Phys. 20, 815

John Towns - In a nutshell



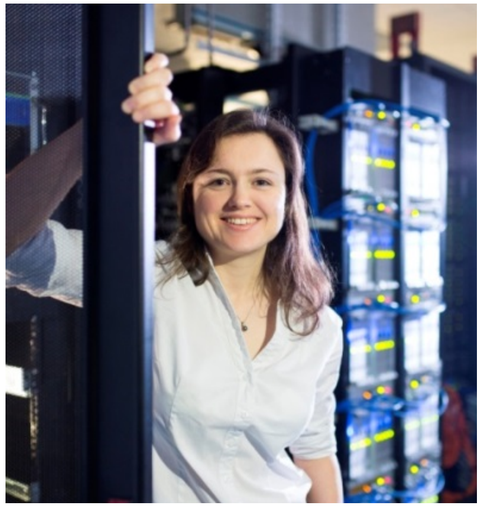
- **Since 2023:** Deputy Director, NCSA @ University of Illinois
- **Since 2022**: PI, ACCESS Coordination Office
- **2011-2022:** PI, XSEDE
- [a bunch of stuff in between…]
- **1992:** Masters in Astronomy – University of Illinois
- **1990:** Masters in Physics – University of Illinois
- **Background**
  - just a mid-western boy from Missouri
  - failed physicist: general relativity
  - failed computational scientist: numerical simulation of black hole spacetimes
  - failed networked applications guy: NLANR-DAST: National Laboratory for Applied Network Research-Distributed Applications Support Team
  - became a research infrastructure builder

NCSA

NSF | ACCESS

XSEDE
Extreme Science and Engineering Discovery Environment

Estela Suarez - In a nutshell



- **Since 2022:** Professor of HPC at University of Bonn
- **Since 2010**: Senior Scientist at Jülich Supercomputing Centre
  (since 2022: Co-lead Division **„*Novel System Architecture Design*“**
  - **Research topics***: (DEEP projects, European Processor Initiative, etc.)*
    - System architecture, modular supercomputing, heterogeneous computing
    - Hardware prototyping, processor and system level co-design
    - System software, porting applications to new architectures
    - Lead of DEEP project series
  - **Community engagement / policy making**: JuWinHPC, Chair of RIAG,…
- **2007–2010**: PhD in Physics at University of Geneva (Switzerland)
- **2005–2007:** Astrophysicist at Paul Scherrer Institut (Switzerland)
- **2001–2004:** Master in Astrophysics - Univ. Complutense of Madrid (Spain)

UNIVERSITÄT BONN

JÜLICH Forschungszentrum

UNIVERSITÉ DE GENÈVE

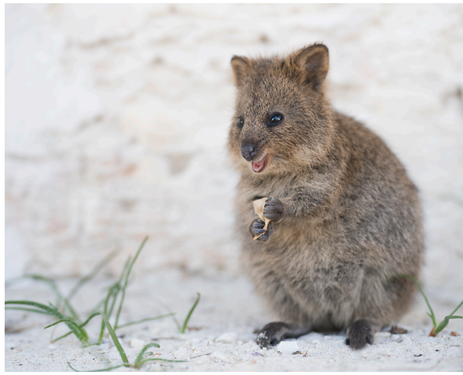
PAUL SCHERRER INSTITUT PSI

Maciej Cytowski

Since 2017: Head of Scientific Services (2019+), Pawsey Supercomputing Research Centre, Perth, Western Australia

design, implementation and delivery of supercomputing, visualization and data services to Australian researchers

2014–2017: Head of Large-Scale Computing Division and Assistant Professor, ICM, University of Warsaw



2004–2014: HPC Specialist at ICM, University of Warsaw and Partnership for Advanced Computing in Europe (PRACE)

2015: PhD in Computational Science, Polish Academy of Sciences

1999–2004: Master in Mathematics, University of Warsaw

What is the recent history of HPC? Where are we now?

Audience Participation Encouraged!

- Please use the microphones to ask questions
- Feel free to add your own comments
- Slido is being monitored (linked in slack)

What languages do you use?

Audience Poll

- Fortran
- C
- C++
- Rust
- Julia
- MatLab
- What else?
- Cuda
- OpenMP
- MPI
- OpenACC
- HIP
- What else?

What compute resources do you use?

Audience Poll

- Large scale HPC clusters, managed by a dedicated team
- Small scale HPC cluster, managed by individuals
- Cloud resources, such as AWS
- Local laptop
- What else?

- CPUs
- GPUs
- Other accelerators or specialized processors
- What else?

Discussion Time