PLEASE JOIN THE ACTION!

BridgeQG

J. BOLMONT FOR THE LOC & SOC

WELCOME!

WELCOME IN PARIS!

BridgeQG

- Thank you for coming!
  - ~110 participants on location!

- Good news: if you read this, you've successfully connected on Zoom, or
  - Your plane was not cancelled
  - You survived Paris transportation system, and
  - You found your way to the Charpak amphitheater

WELCOME

IMPORTANT STUFF FIRST

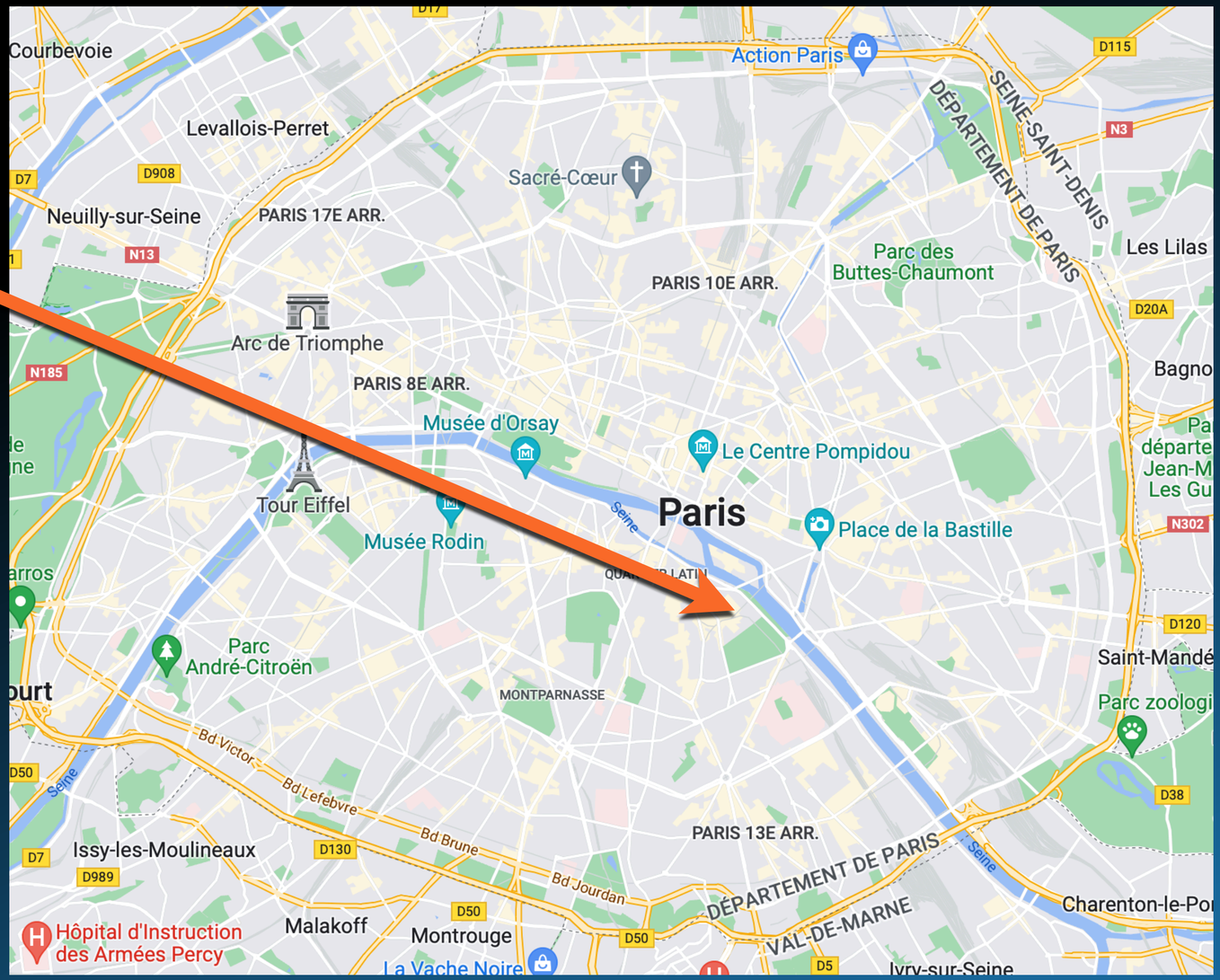
BridgeQG

- Wifi connexion: **`eduroam`** - or **`CONGRES`** (using the voucher)
- Please wear your name tag!
  - Especially important to access the Tower on Wednesday
- Check your certificate of attendance and tell us if you need a change

WELCOME

SOME PLACES

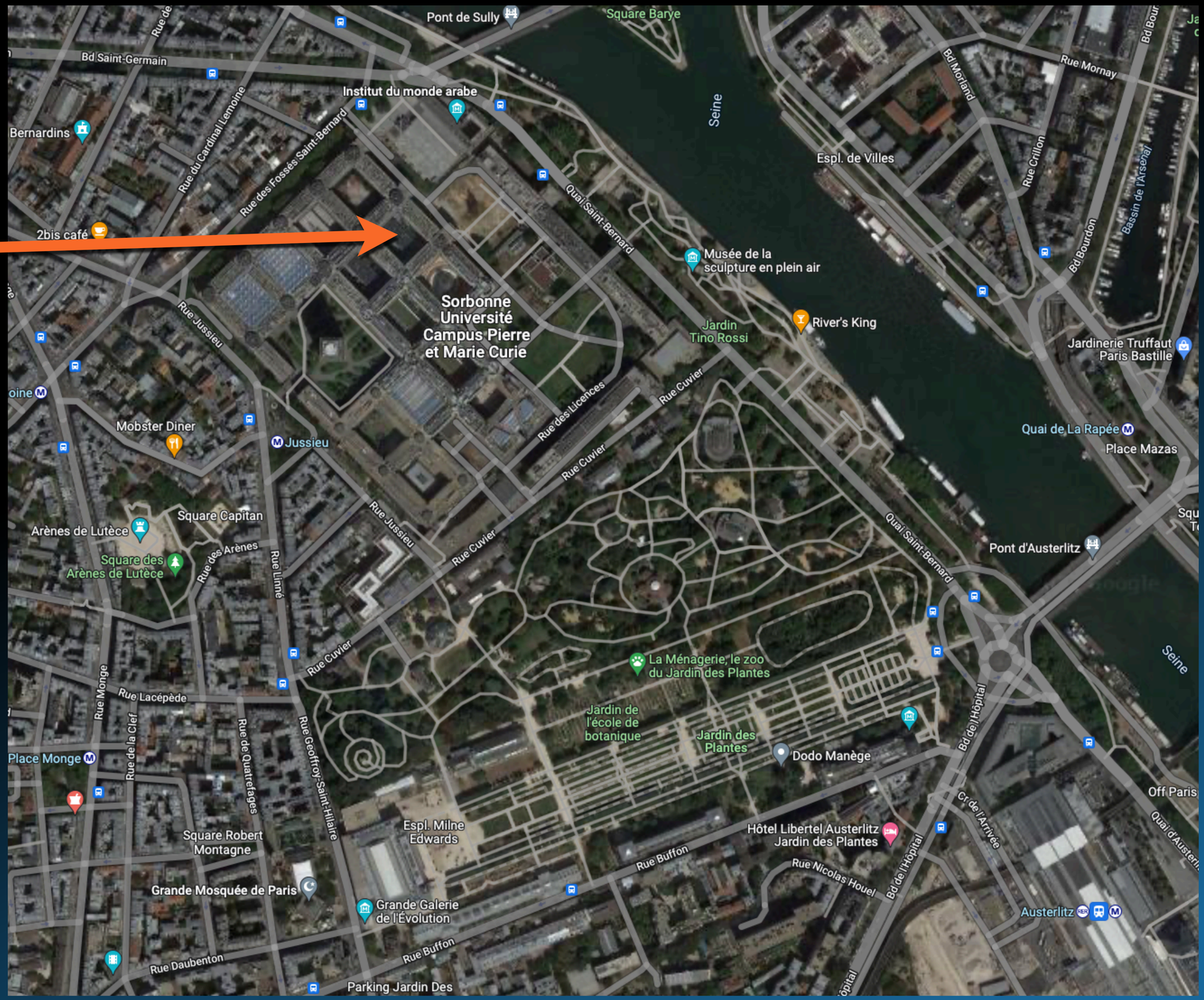
- We are here



WELCOME

SOME PLACES

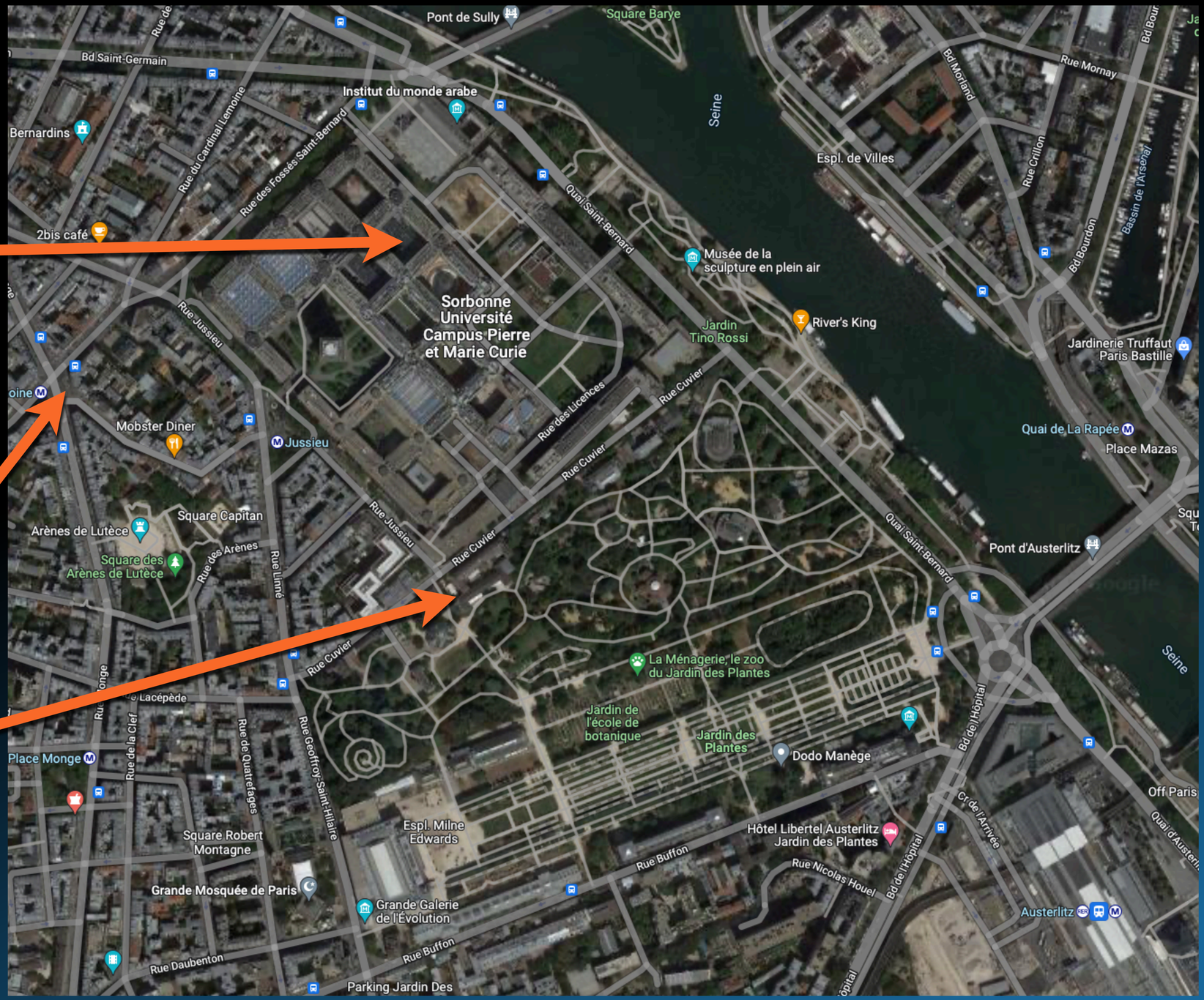
- We are here



WELCOME

SOME PLACES

- We are here
- A high place of Science history
  - Laws of electrodynamics (A.M. Ampère)
  - Discovery of radioactivity (H. Becquerel)
  - …

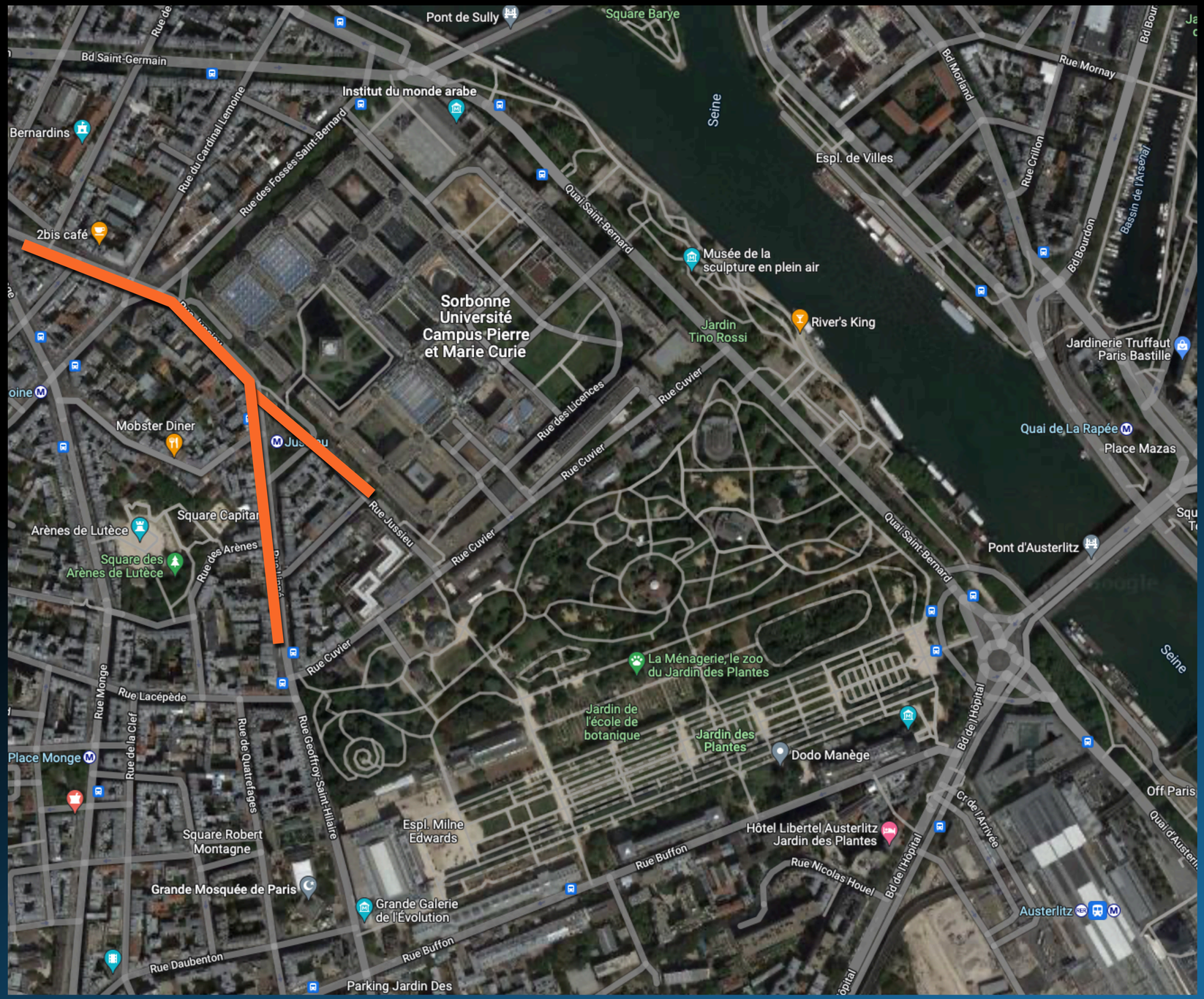


WELCOME

SOME PLACES

- You'll find plenty of restaurants, bakeries & mini-markets around

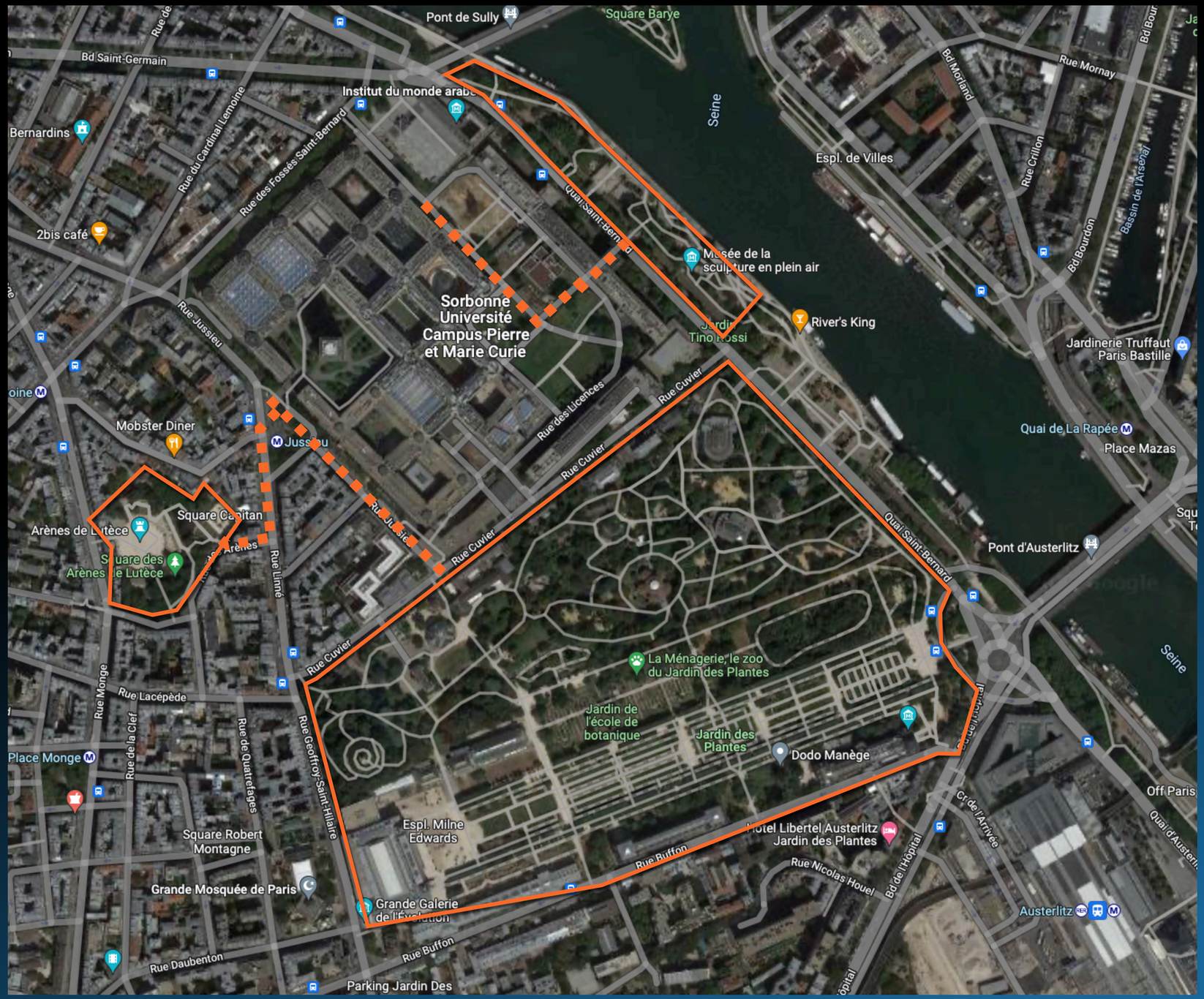
- Lunch breaks are quite short



WELCOME

SOME PLACES

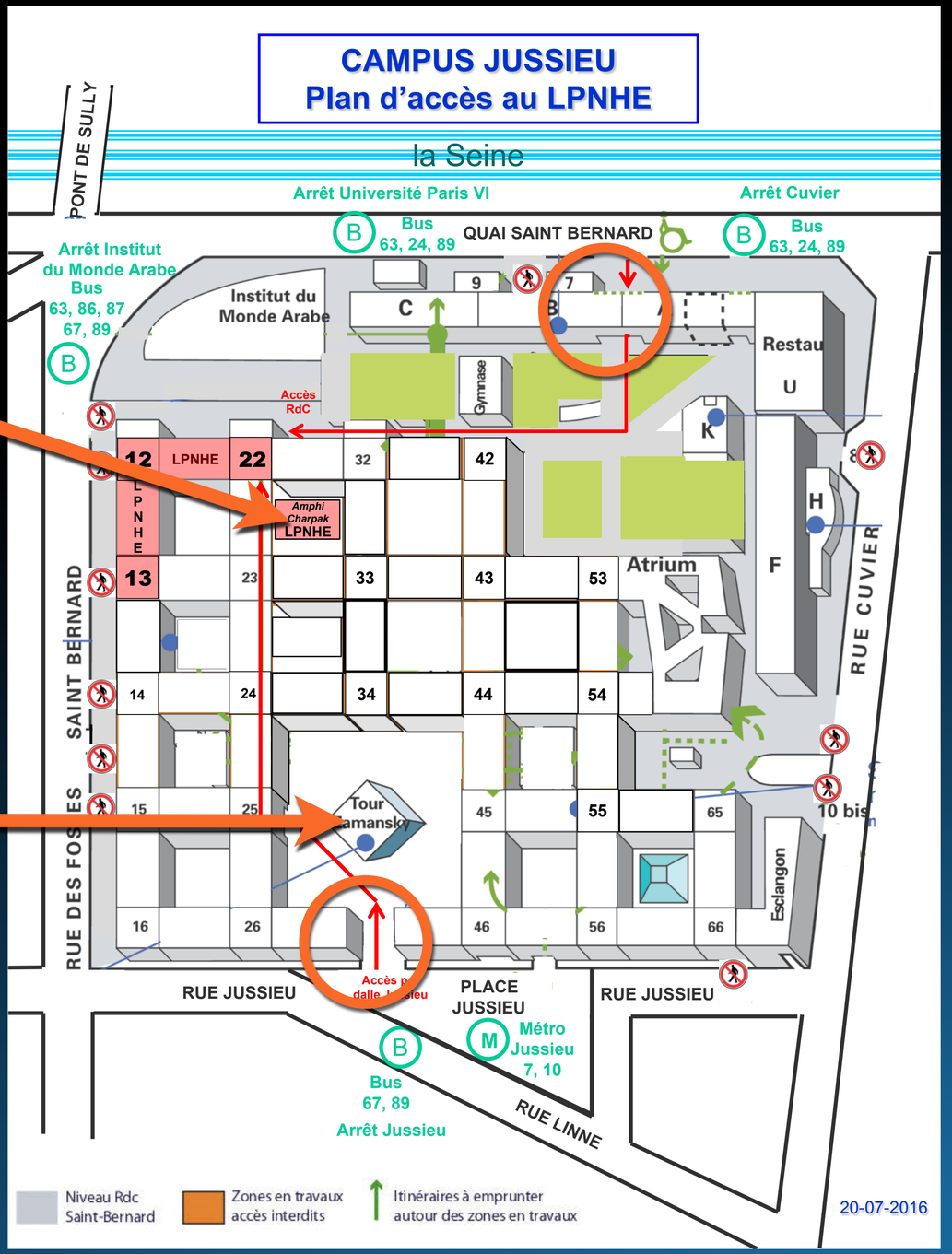
- These are nice places to have your lunch (« to go »):
  - Arènes de Lutèce
  - Jardin des plantes
  - Jardin Tino Rossi (by river Seine)



WELCOME

CLOSER LOOK

- We are here
- Bus stations/Subway station are indicated
- On Wednesday, we'll have our « Social Mixer » at the top of the tower here
- NB: only two entrances/exits on the campus for pedestrians (circles)



WELCOME

SESSIONS

BridgeQG

- All sessions will take place here
- The schedule is tight

⚠️ We ask session conveners to be very strict on time!!

WELCOME

SESSIONS

Registration - Coffee
Amphithéâtre Charpak, LPNHE 12:30 - 13:30

Welcome address *Giulia Gubitosi et al.*
Amphithéâtre Charpak, LPNHE 13:30 - 13:50

Working Group Introductions 1
Amphithéâtre Charpak, LPNHE 13:50 - 15:30

Coffee Break
Amphithéâtre Charpak, LPNHE 15:30 - 16:00

Working Group Introductions 2
Amphithéâtre Charpak, LPNHE 16:00 - 18:10

General Discussion
Amphithéâtre Charpak, LPNHE 18:10 - 19:00

Welcome Cocktail
Amphithéâtre Charpak, LPNHE 19:00 - 21:00

Working Group Introductions 3
Amphithéâtre Charpak, LPNHE 09:00 - 09:50

WG1 High Energy QG Theory 1
Amphithéâtre Charpak, LPNHE 09:50 - 10:50

Coffee Break
Amphithéâtre Charpak, LPNHE 10:50 - 11:20

WG1 High Energy QG Theory 2
Amphithéâtre Charpak, LPNHE 11:20 - 12:40

Lunch Break
12:40 - 14:00

WG2 High Energy QG Experiments
Amphithéâtre Charpak, LPNHE 14:00 - 16:20

Coffee Break
Amphithéâtre Charpak, LPNHE 16:20 - 16:50

WG3 Low-energy Gravitational Effects in Quantum Systems 1
Amphithéâtre Charpak, LPNHE 16:50 - 18:50

[Outreach Event] La gravitation : de la relativité générale à la gravitation quantique *Philippe Jetzer*
Amphithéâtre Charpak, LPNHE 19:00 - 20:00

WG3 Low-energy Gravitational Effects in Quantum Systems 2
Amphithéâtre Charpak, LPNHE 09:00 - 10:40

Coffee Break
Amphithéâtre Charpak, LPNHE 10:40 - 11:00

WG1 High Energy QG Theory 3
Amphithéâtre Charpak, LPNHE 11:00 - 13:00

Lunch Break
13:00 - 14:00

WG4 Low-energy high-precision experiment
Amphithéâtre Charpak, LPNHE 14:00 - 15:20

WG5 Connection between low-energy and high-energy quantum gravity 1
Amphithéâtre Charpak, LPNHE 15:20 - 16:20

Move to amphi 15 + Coffee Break
Amphithéâtre 15, Sorbonne Université 16:20 - 17:00

[Physics department seminar] Bridging high and low energies in search of quantum gravity *Giulia Gubitosi*
Amphithéâtre 15, Sorbonne Université 17:00 - 18:00

Social Mixer
2400, Tour Zamanski - 24th Floor 19:00 - 21:00

WG5 Connection between low-energy and high-energy quantum gravity 2
Amphithéâtre Charpak, LPNHE 09:00 - 11:00

Coffee Break
Amphithéâtre Charpak, LPNHE 11:00 - 11:25

WG1 High Energy QG Theory 4
Amphithéâtre Charpak, LPNHE 11:25 - 12:25

General discussions
Amphithéâtre Charpak, LPNHE 12:25 - 13:30

Lunch Break
13:30 - 14:30

MC Meeting
Amphithéâtre Charpak, LPNHE 14:30 - 17:30

WELCOME

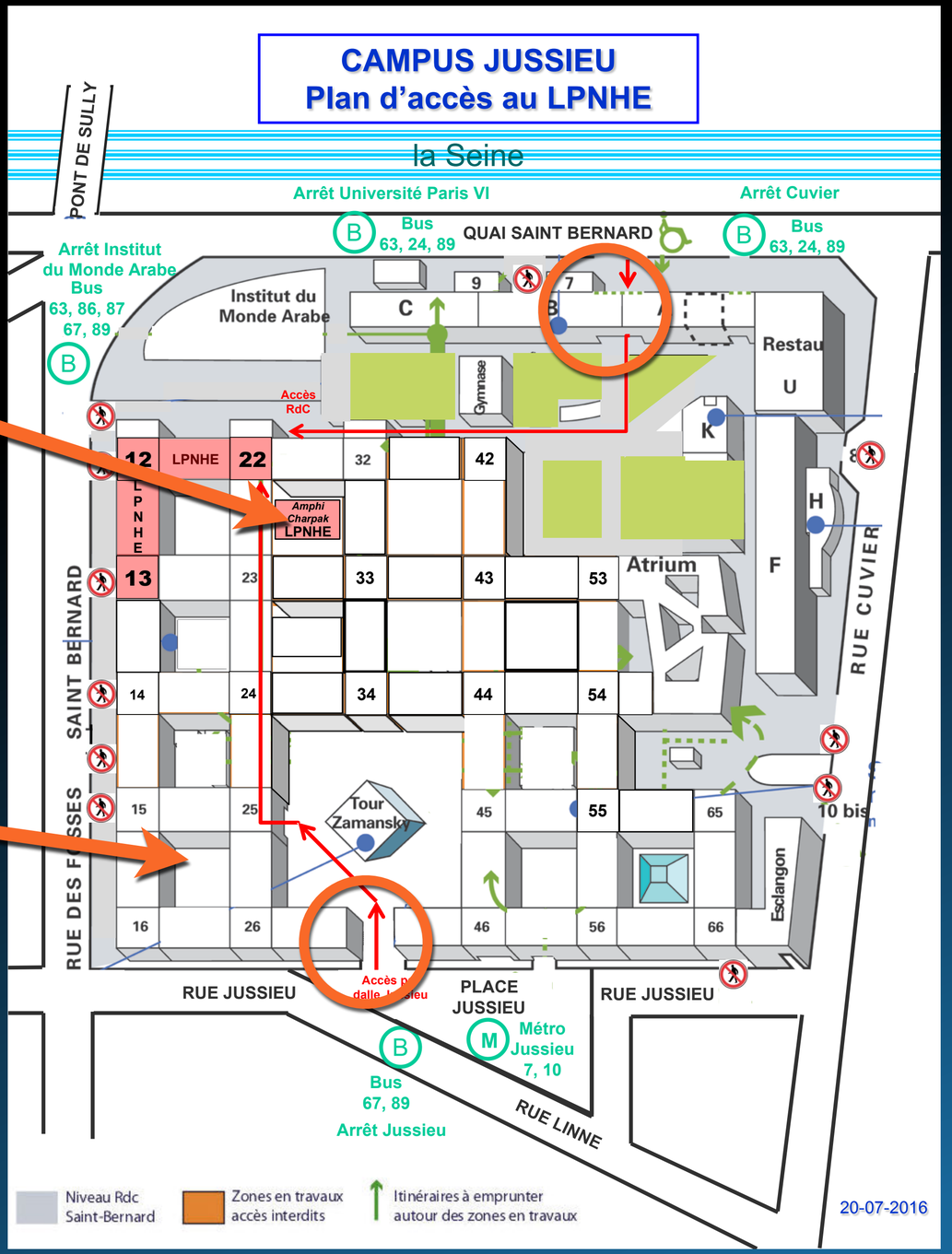
SOCIAL EVENTS

- Welcome Cocktail outside of the amphitheater - Today at 7PM
- Group photo - Wednesday 4:20PM
- Social Mixer at the top of Tower Zamanski - Wednesday 7PM-9:30PM

WELCOME

SPECIAL SEMINARS

- We are here
- On Tuesday evening, 7PM, here
  - **Outreach event**: « La gravitation : de la relativité générale à la gravitation quantique » by Philippe Jetzer
- On Wednesday, 5PM, Amphi 15
  - **Spécial seminar of the physics department**: « Bridging high and low energies in search of quantum gravity » by Giulia Gubitosi



LAST WORD

BridgeQG

- Need help?
  - Come see Isabelle, Rafa, Ugo, Daniel or me!

ENJOY!

COST Action CA23130

Bridging high and low energies in search of quantum gravity (BridgeQG)

Giulia Gubitosi - Università di Napoli Federico II & INFN

BridgeQG - Motivation

- Astrophysical observations are now potentially sensitive to tiny residual effects of Planck-scale physics (see QGMM review)

- Table-top experiments are reaching the precision needed to test the interplay between gravity and quantum systems at ultra-low energies

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Main Aim

To investigate the interface between high-energy quantum gravity and quantum aspects of gravity in the low-energy regime, using both theoretical and experimental tools, in order to construct a phenomenologically viable theory of quantum gravity.

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BridgeQG - Theoretical questions

- Is gravity quantised, and what constitutes a quantum signature of gravity? [Entanglement, …]
- What are the symmetries at the Planck scale?
- Is there a separation of scales in gravitational interactions, or shall we expect ultraviolet effects to percolate to low energies?
- How are observers & reference frames defined in QG?
- How does gravity (both classical and quantum) affect the dynamics of quantum systems? [Decoherence, modified Schoroedinger equation,…]

QUANTUM GRAVITY BRIDGING HIGH & LOW ENERGIES

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Objectives - Research coordination

- To initiate a long-lasting **exchange** between scientists searching for QG on the highest and lowest energy scales
- To develop a **common understanding** of the theoretical challenges posed by the development of a theory encompassing gravitational and quantum effects into a unified framework, at low and high energies.
- To systematically place **experimental results** coming from high-energy astrophysical observations and high-precision low-energy table-top experiments into a **unified parameter space**.
- To explore the possibility of **detecting direct or indirect quantum-gravity signatures** by combining results from low-energy table-top experiments and from high-energy astrophysical observations, or by devising **new experiments** which combine the technological know-how of the two experimental communities.
- To **disseminate** new research results to the general public and stakeholders.

QUANTUM GRAVITY BRIDGING HIGH & LOW ENERGIES

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Objectives - Capacity building

- To promote the **exchange of expertise** across the different communities involved and build a joint research agenda
- To develop a **multi-disciplinary approach** to the challenge and bridge the separate communities that are currently working on different aspects of QG and gravitational interactions in quantum systems.
- To strengthen the **newly-formed community** investigating QG on all scales
- To promote **Diversity, Equity and Inclusion** (DEI) principles in the community

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Deliverables - Research related

- Publication of an online document providing a **vademecum** to clarify and unify language between communities.
- **Survey** and comparison of different **decoherence** mechanisms induced by quantum and classical gravity effects.
- Systematic collection of available **experimental constraints** on QG and gravitational interaction with quantum systems.
- Publication of at least **8 papers per year** in high impact, international journals.
- Publication and maintenance of a **living review** summarising the state of the art in the field.
- **Survey** on the notions of **observers in quantum information and QG**, clarifying the notions employed in both approaches and bringing them closer to each other.

QUANTUM GRAVITY BRIDGING HIGH & LOW ENERGIES

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Deliverables - Dissemination

- Set up of the **Action web page** and of the social media profiles, including a publicly available page to collect questions from the general public.
- Publication of the **recordings/slides** of seminars delivered in the Action Annual Conferences.
- Publication of the recordings and **notes** of the annual **Training School** lectures.
- Report on **public outreach event** attached to each of the Action Annual Conferences.
- Production and publication of short **texts/videos** answering the questions asked in the publicly available page.
- Report on annual **online outreach event aimed at school students**, to inspire young pupils for the research on fundamental physics.
- Publication of the recordings and/or slides of the **online seminars** aimed at Action members.

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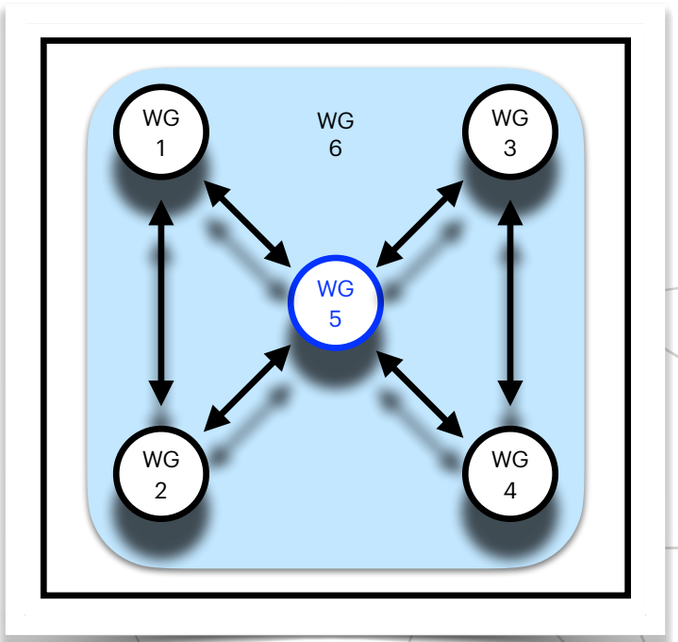
Working Groups

- **Action Chair:** Giulia Gubitosi
- **Action vice-Chair:** Flaminia Giacomini

- **WG1: High-energy quantum gravity theory (226 participants)**
  Christian Pfeifer, Alessia Platania
- **WG2: High-energy quantum gravity experiment (90 participants)**
  Tomislav Terzic, Alba Domi
- **WG3: Low-energy gravitational effects in quantum systems (164 participants)**
  Lin-Qing Chen, Thomas Galley
- **WG4: Low-energy high-precision experiment (70 participants)**
  Matteo Fadel, Catalina Curceanu
- **WG5: Connection between low-energy and high-energy quantum gravity (182 part.)**
  Flavio Mercati, Giacomo Rosati
- **WG6: Dissemination and Diversity (76 participants)**
  Jelena Striskovic, Denitsa Staicova

(more details in the MoU @ https://www.cost.eu/actions/CA23130)



BridgeQG - Network

- 27 COST Full Member Countries
  - 14 Inclusiveness Target Countries
  - 2 International Partner countries (Canada, United States)

- ~300 individual members
  - 55% Young Researchers and innovators
  - 18% women
  - 28% from ITC

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Action meetings

- **Action Annual Conference (this conference!)**
  - Paris 7-10 July 2025

Invited speakers

Denise Boncioli (University of L'Aquila), Caslav Brukner (IQOQI Vienna & University of Vienna), Astrid Eichhorn (University of Heidelberg), Francesco Marin (University of Florence), Ana Maria Raclariu (King's College London), Antoine Tilloy (Mines ParisTech).

LOC/SOC

Local Organization Commettee: J. Bolmont (LPNHE, Paris, France), R. Alves Batista (LPNHE/IAP, Paris, France), I. Cossin (LPNHE, Paris, France).

Scientific Organization Committee: L.-Q. Chen (Vienna U, Austria), A. Domi (ECAP Erlangen-Nürnberg U, Germany), M. Fadel (ETH Zürich, Switzerland), T. Galley (IQOQI Vienna, Austria), F. Giacomini (ETH Zürich, Switzerland), G. Gubitosi (U Napoli Federico II, Italy), F. Mercati (Burgos U, Spain), C. Pfeifer (ZARM, Bremen U, Germany), G. Rosati (U Cagliari, Italy), J. Striskovic (Osijek U, Croatia), T. Terzic (Rijeka U, Croatia), M. Tortola (IFC Paterna, Spain).

QUANTUM GRAVITY BRIDGING HIGH & LOW ENERGIES

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Action meetings

- **Drop Tower workshop “Quantum Systems in Free Fall”**
  - Bremen 6-8 May 2025
  - Organised together with COST Action RQI

Organization

Local organizers

All Email addresses end with **@zarm.uni-bremen.de**.

Dr. Christian Pfeifer, ZARM, University of Bremen
Email: christian.pfeifer

Dr. Dennis Rätzel, ZARM, University of Bremen
Email: dennis.raetzel

Dr. Eva Hackmann, ZARM, University of Bremen
Email: eva.hackmann

Marian Cepok, ZARM, University of Bremen
Email: marian.cepok

International Program Committee

Dr. Giulia Gubitosi, Universita Degli Studi Di Napoli

Dr. Charis Anastopoulos, University Campus Rio Patras

Dr. Albert Roura, Deutsches Zentrum für Luft- und Raumfahrt

Dr. Lin-Qing Chen, University of Vienna

Dr. Giacomo Rosati, Uniwersytet Wroclawski

Dr. Tomislav Terzić, University of Rijeka

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Training School

- Searching for Quantum Gravity in the Sky
  - Bad Honnef 16-21February 2025

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Other Activities

- Monthly Action-wide online seminars
- WG-dedicated online seminars
- Outreach events (at annual conferences and online)

Reach out if you have ideas for activities and outreach!

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Let’s connect!

- https://web.infn.it/BridgeQG/

- Social media:

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