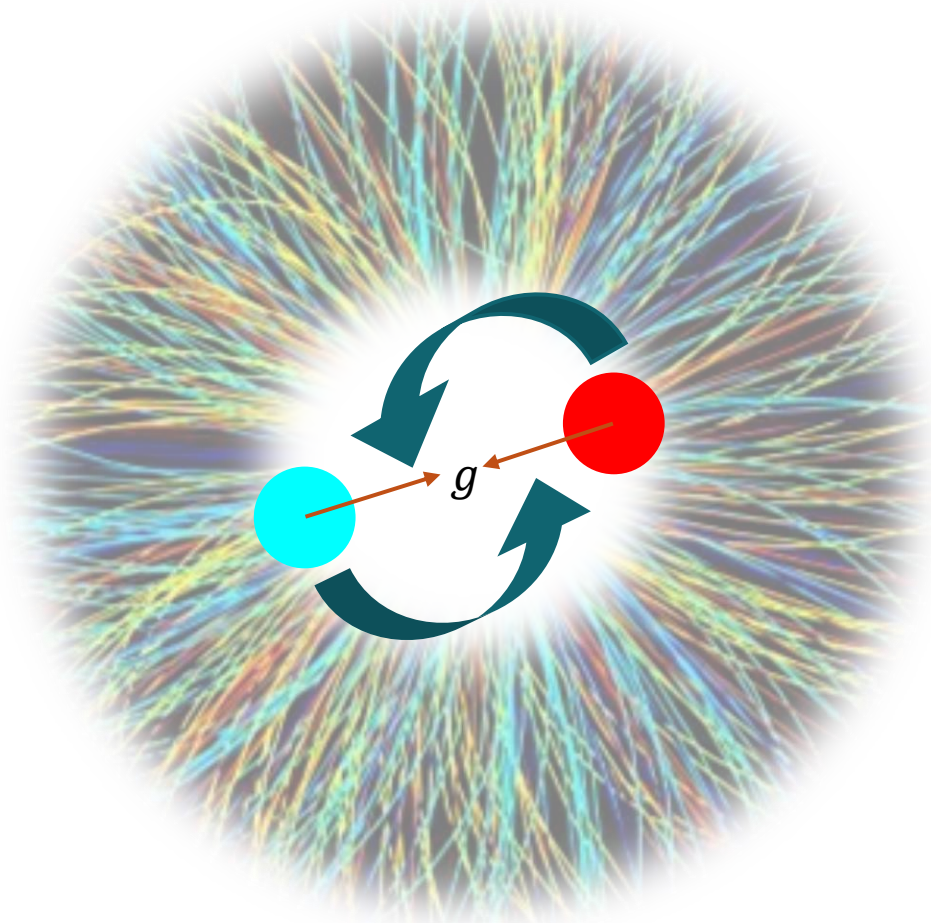


DESY Fellows Day – 2024.06.14

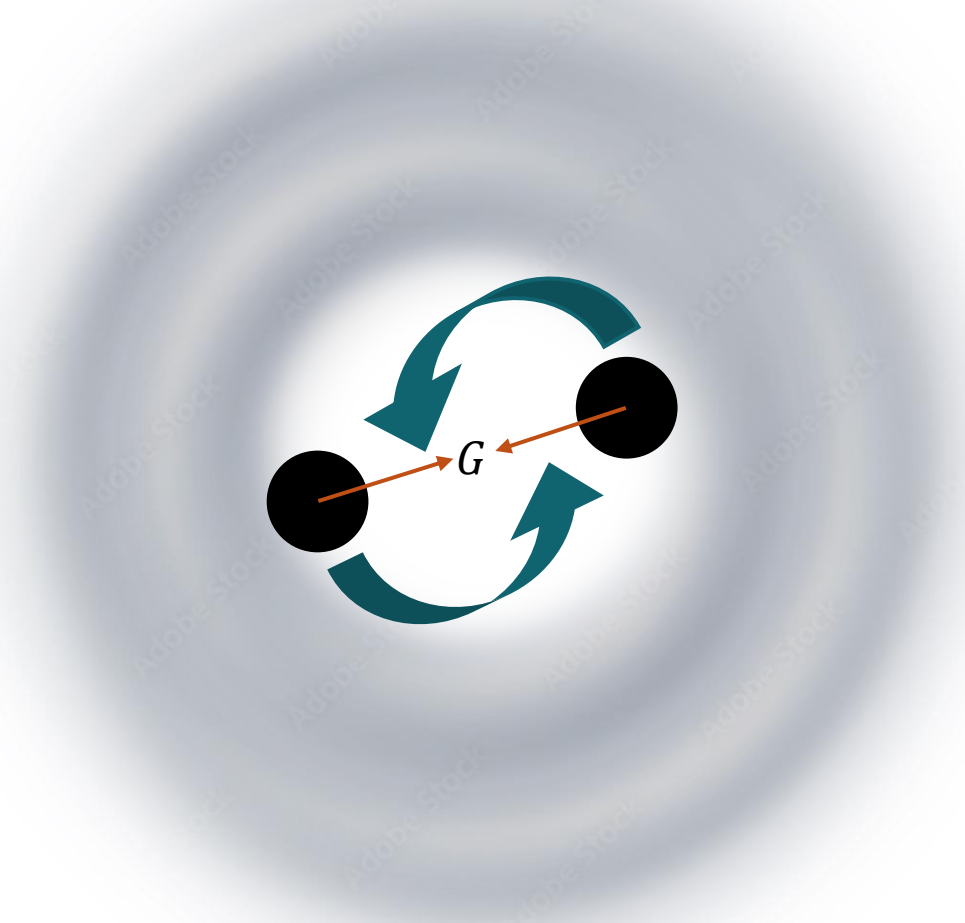
Self-Destructive Inward Spiralling at the Two Infinities

David Rousso
FH-ATLAS/ALPS

My Current Work



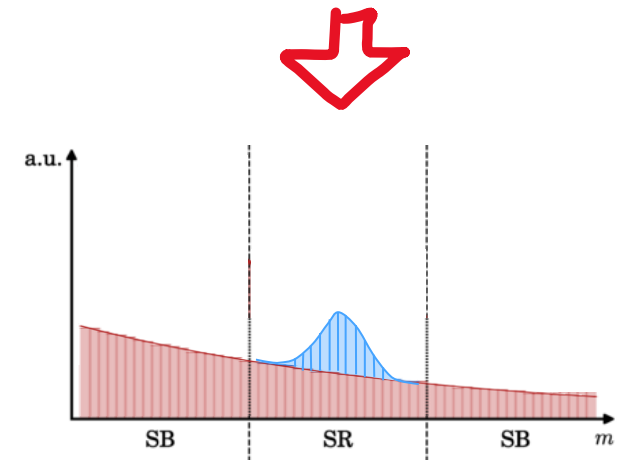
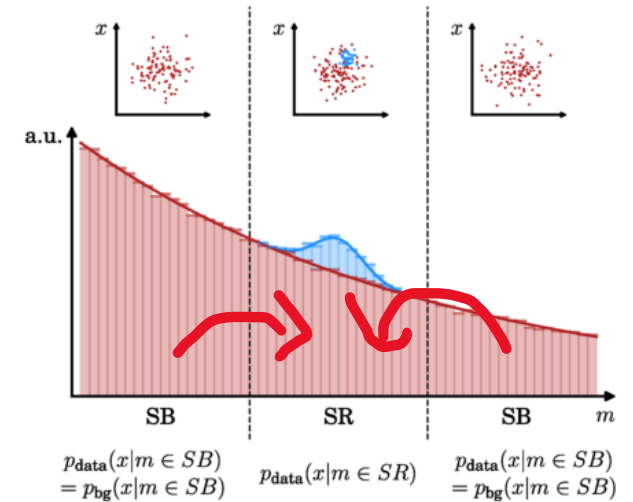
Searching for **quirk pair decays** using the **underlying event**



Searching for **primordial black holes mergers** using **high-frequency gravitational waves (GW)**

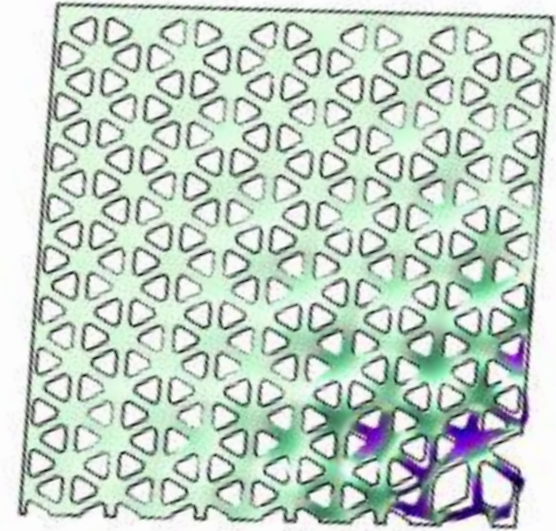
ATLAS: ML on the Underlying Event

- Use **machine learning on underlying event** to improve sensitivity to **otherwise buried resonance**
- **CATHODE** (Classifying Anomalies THrough Outer Density Estimation) takes info from underlying event variables in **resonant sidebands to predict distributions in resonant signal region**
- Then **train classifier** on **difference between data and predicted distribution** to create a selection to «unbury» the resonant signal, and estimate background
- I work with **Sarah Heim**'s group on studies in implementation of CATHODE with quirks, and sensitivity/limits estimation for final paper



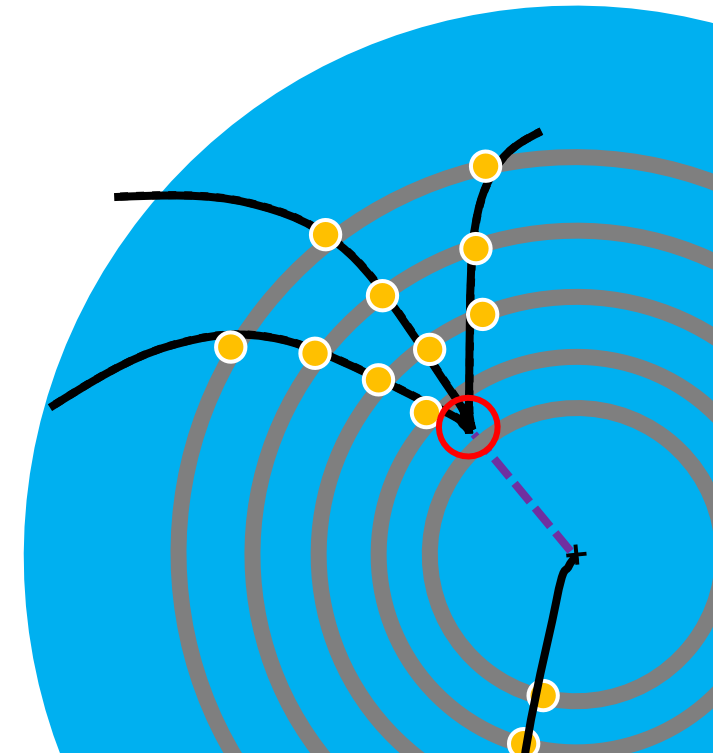
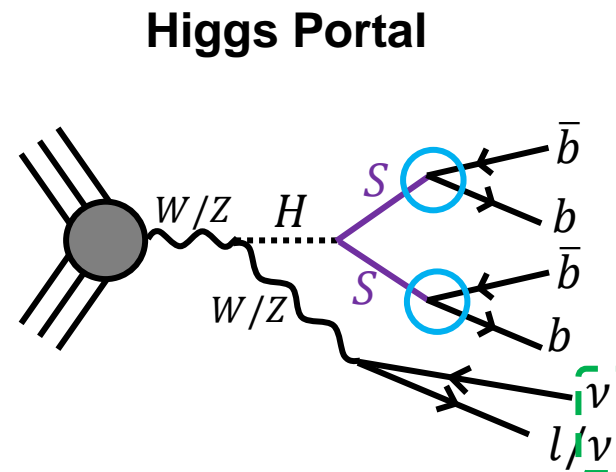
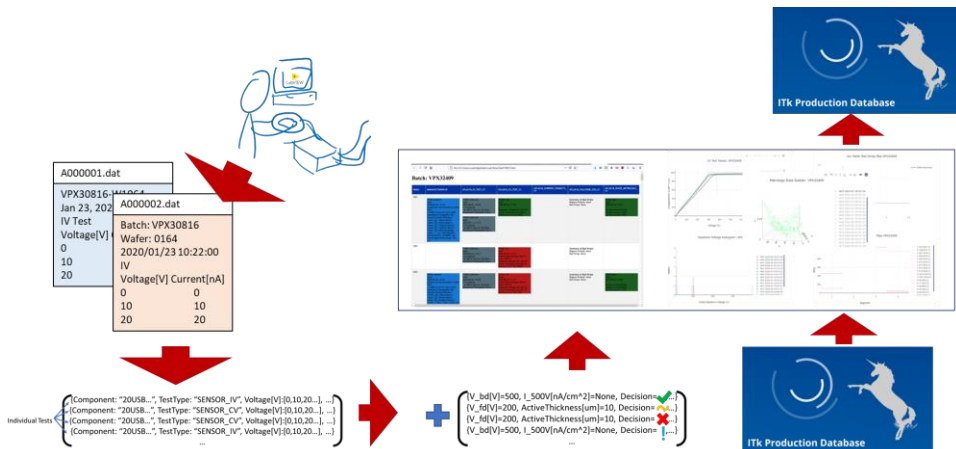
ALPS: Membranes as High Freq. GW Detectors

- **GW frequencies higher than LIGO range**
interesting for neutron star mergers and primordial black holes
- Smaller and **more sensitive interferometry** required
- Couple interferometer with a **mechanical nano-membrane** that follows laser antinodes, whose bending can be measured more easily
- I work with **Christoph Reinhardt**'s group on designing and simulating these membranes in COMSOL



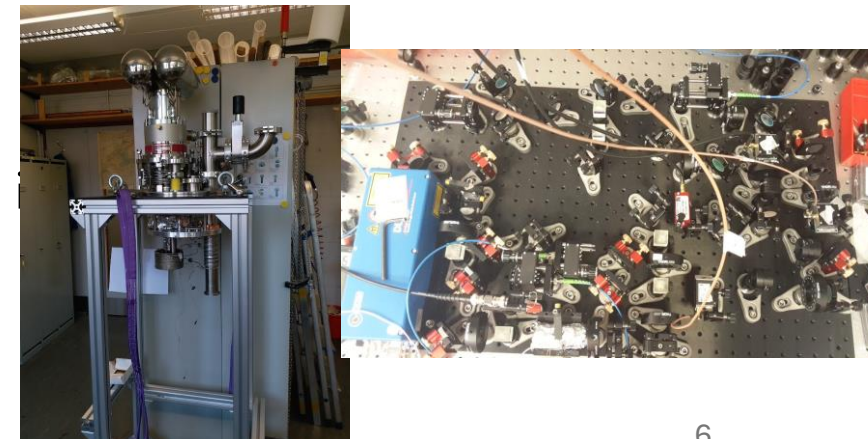
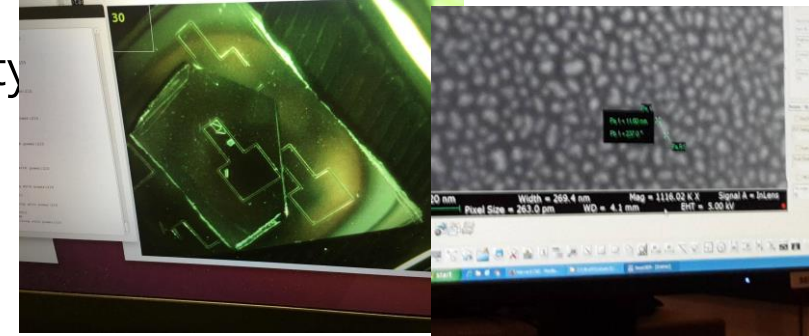
About Me: PhD

- **PhD** in **ATLAS** at University of Cambridge in the **UK**
 - 2 **searches for long-lived particles** with **displaced vertex** signatures
 - Developed software framework for **inner tracker upgrade (ITk)** strips sensor quality control



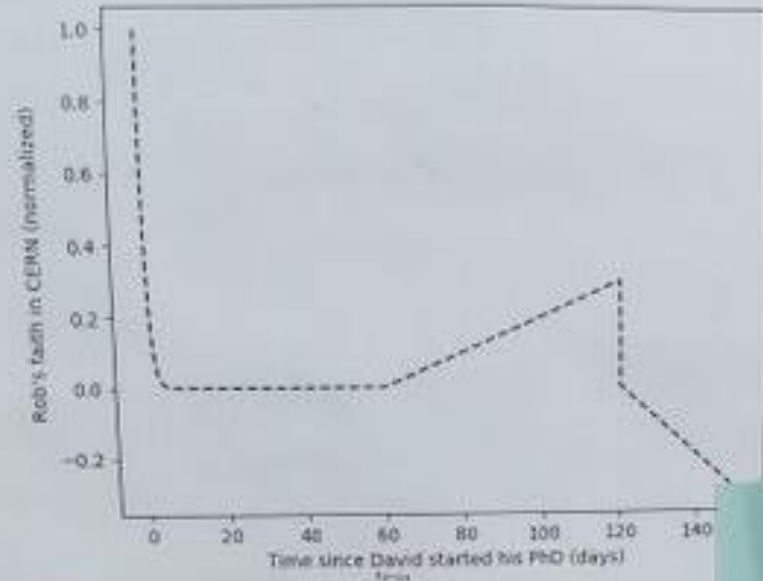
About Me: Before the PhD

- Undergrad in **Nanotechnology Engineering** at the University of Waterloo in Canada
 - Directed an undergraduate research group on competition **microbot R&D** (Canada)
 - Designed **metasurface photonics** for hologram and flat lens applications (US)
 - R&D for **biosensing plasmonics** for athletic performance applications (US)
 - Designed and built setup to study collapse of **Bose-Einstein Condensates** (UK)
 - Interned as **program manager** @ Microsoft (Japan)
 - Studies for experiment to see if **antimatter falls up or down** (Switzerland)
- Associates degree in piano performance with qualification elementary piano pedagogy



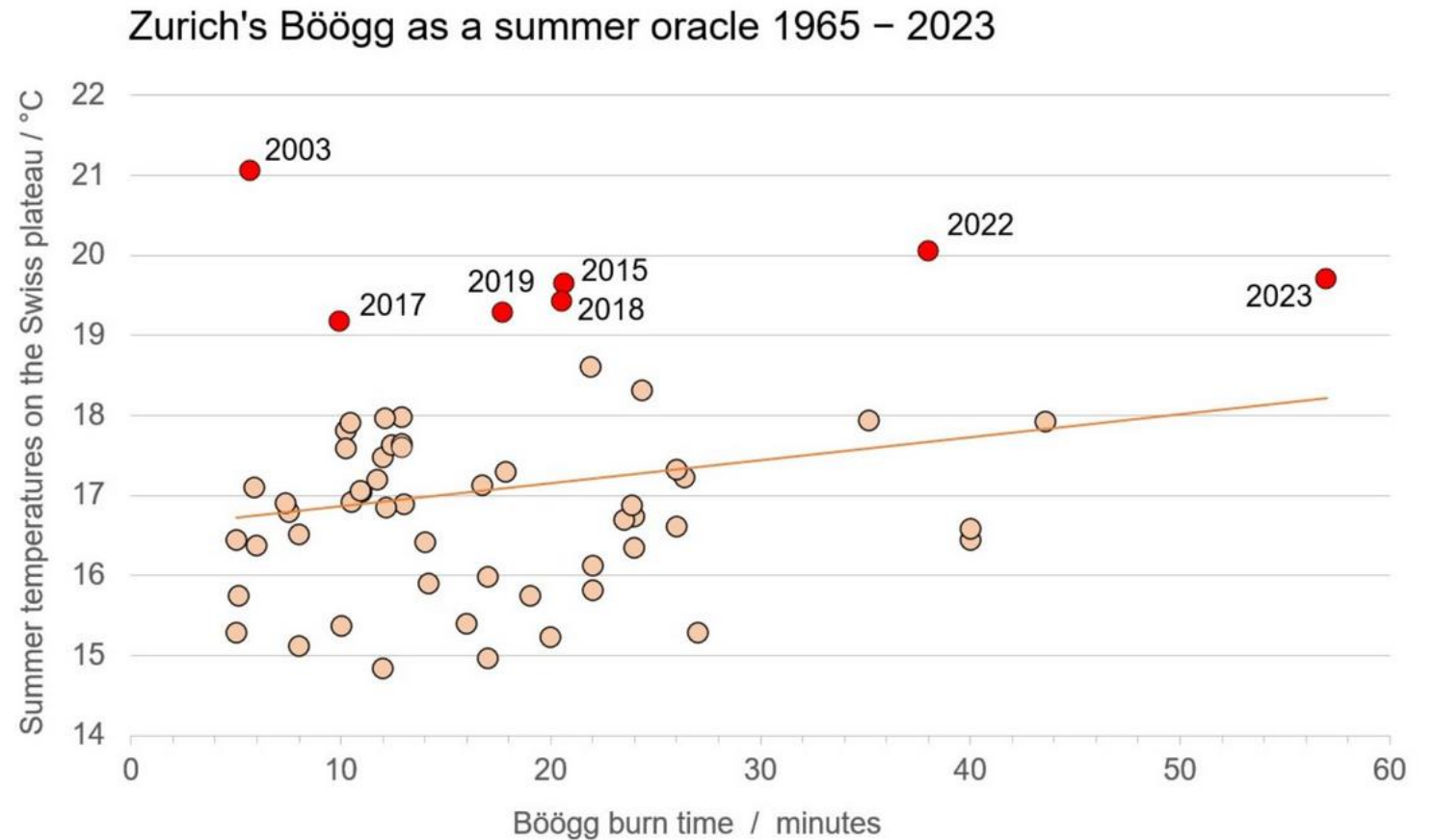
Favourite Plot

Rob's faith in CERN (normalized)



Time since David started his PhD (days)

More Serious Favourite Plot



<https://www.meteoswiss.admin.ch/weather/weather-and-climate-from-a-to-z/boeoegg-prediction.html>

Thank you
