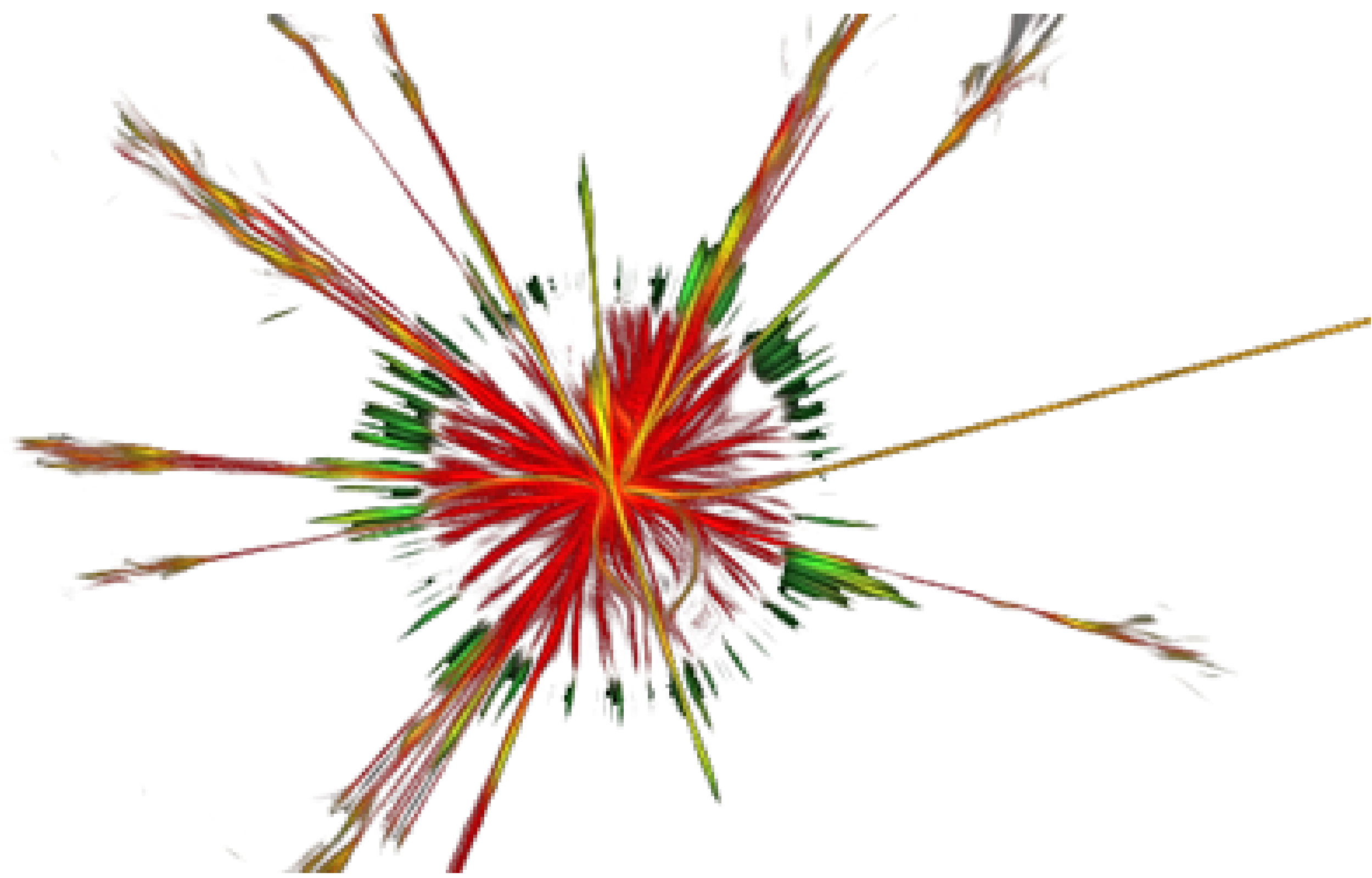# PARTICLE PHYSICS

Prof Csaba Balázs, A/Prof Peter Skands, Prof German Valencia, Dr Peter Athron

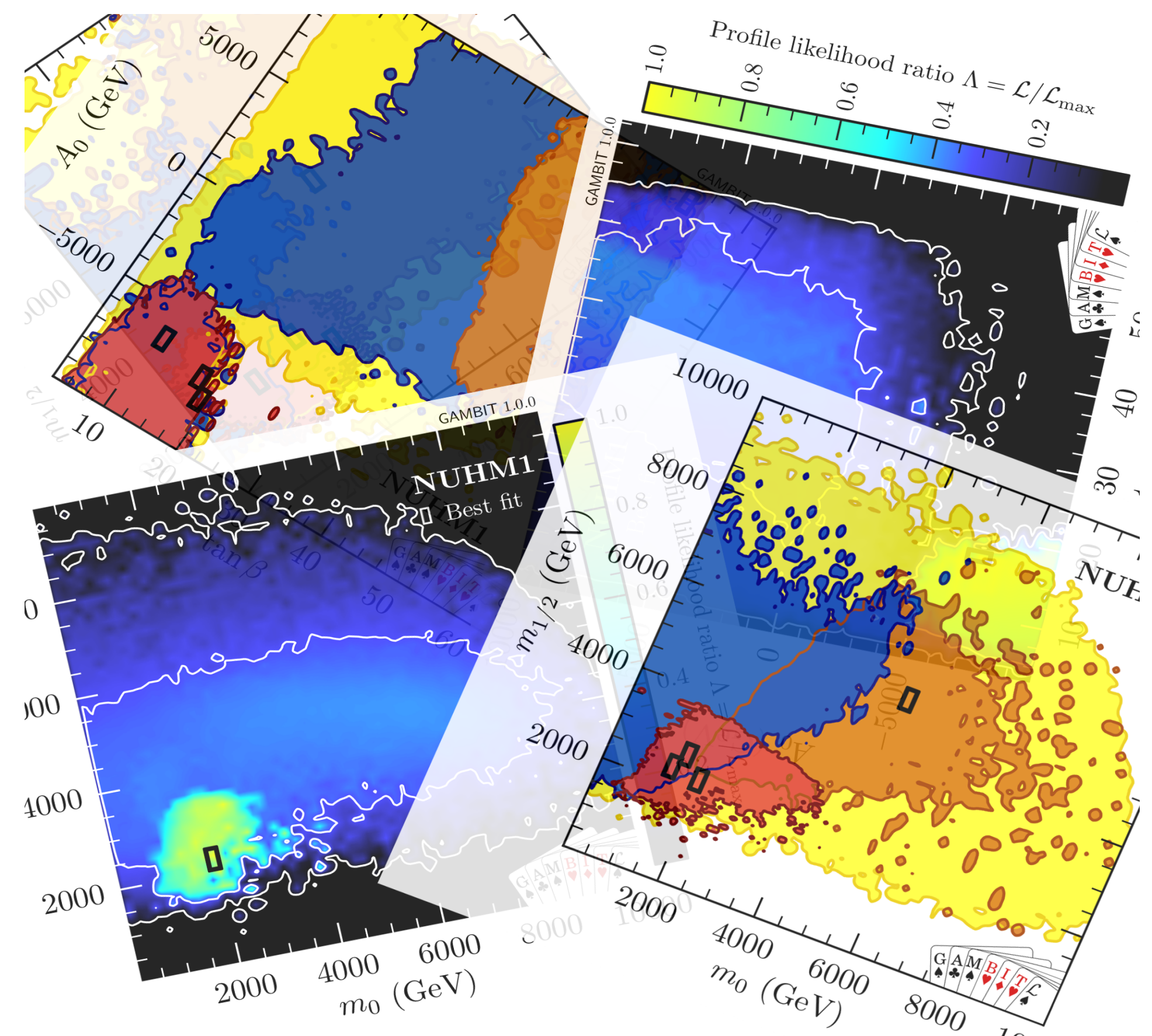School of Physics and Astronomy, Monash University

Quantum Chromodynamics

- Understand the physics of high-energy particle collisions at the LHC
- Develop detailed models of physical processes and use Markov-Chain Monte Carlo methods to sample the (quantum) probability distributions
- Contribute to one of the most important computer programs in physics!
- Speak to Peter Skands

Particle phenomenology

- Study beyond the Standard Model physics
- Investigate its signatures in dark matter and LHC experiments
- Discover which models are compatible with the latest data
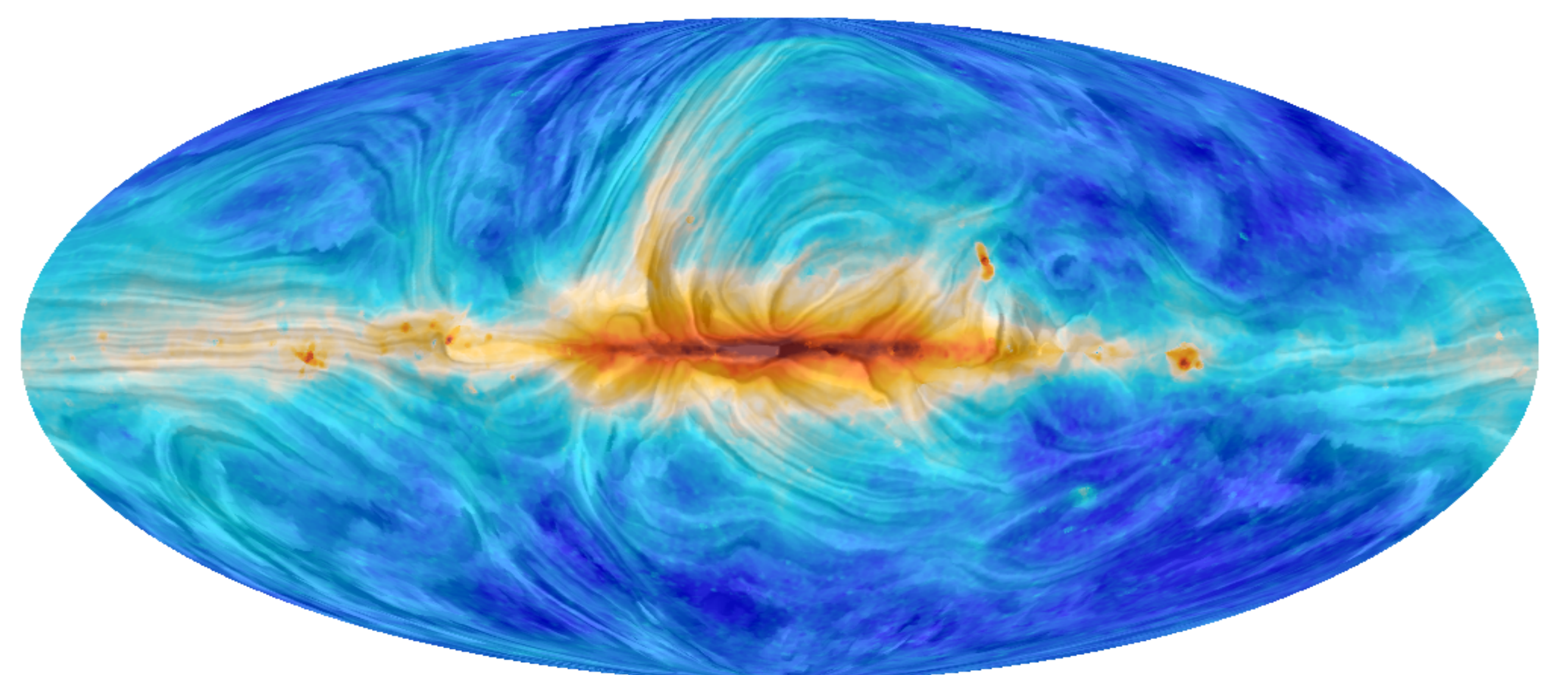- Speak to Csaba Balázs, Peter Athron or German Valencia

Flavour physics

- Investigate the origin of flavour in the Standard Model
- Link flavour to grand unification of forces
- Speak to German Valencia

Illustration: © Johan Jarnestad/The Royal Swedish Academy of Sciences

Particle cosmology

- Investigate the origin of matter over anti-matter in the Universe
- Model phase transitions and gravitational waves in the early Universe
- Study aspects of the dark Universe: dark matter, dark forces, dark energy
- Speak to Csaba Balázs

Speak to German Valencia

- Study of Flavour Anomalies
- High dimensional data visualisation in high energy physics

Speak to Peter Athron

- Higgs physics and dark matter in supersymmetric models
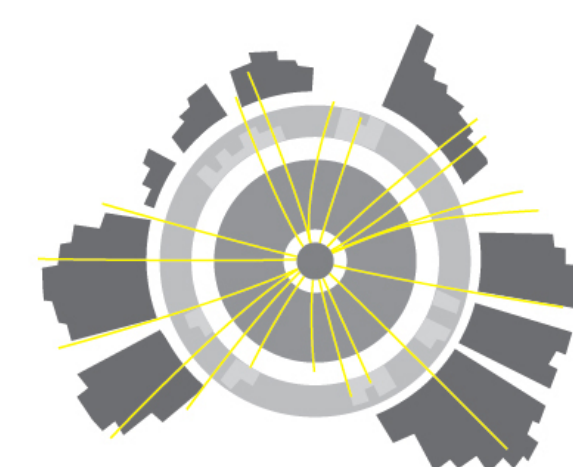- Supersymmetric phenomenology

Speak to Csaba Balázs

- Cosmology of the electroweak symmetry breaking
- Supersymmetric origin of matter
- Extra dimensional dark matter

Speak to Peter Skands

- Physics of "jets": radiation patterns of interacting high-energy particles
- Colour strings: Hadronisation in Quantum Chromodynamics
- "Virtual Colliders": Monte Carlo simulations of high-energy processes
- Confronting theory and experiment at the Large Hadron Collider

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COEPP
ARC Centre of Excellence for Particle Physics at the Terascale