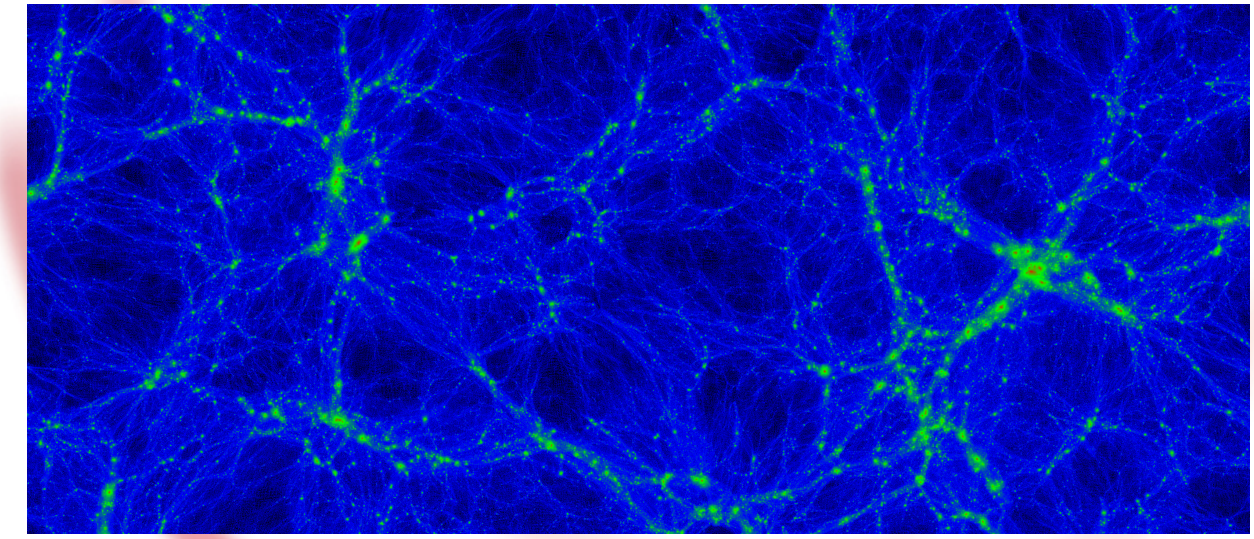
Cosmological Theory & Simulations

Modeling Dark Matter & Galaxy Formation



International Centre for Radio Astronomy Research

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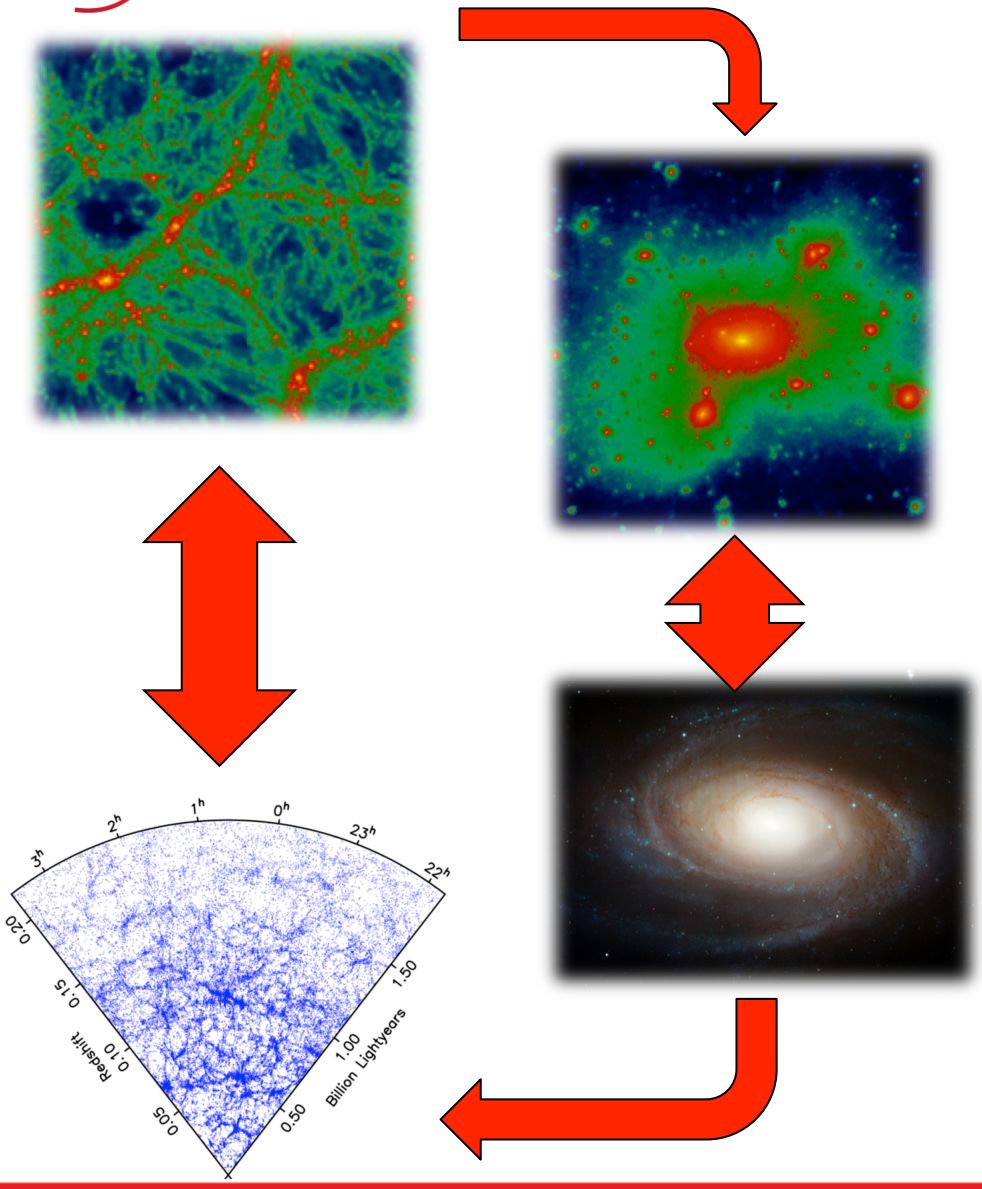
Curtin University

THE UNIVERSITY OF WESTERN AUSTRALIA

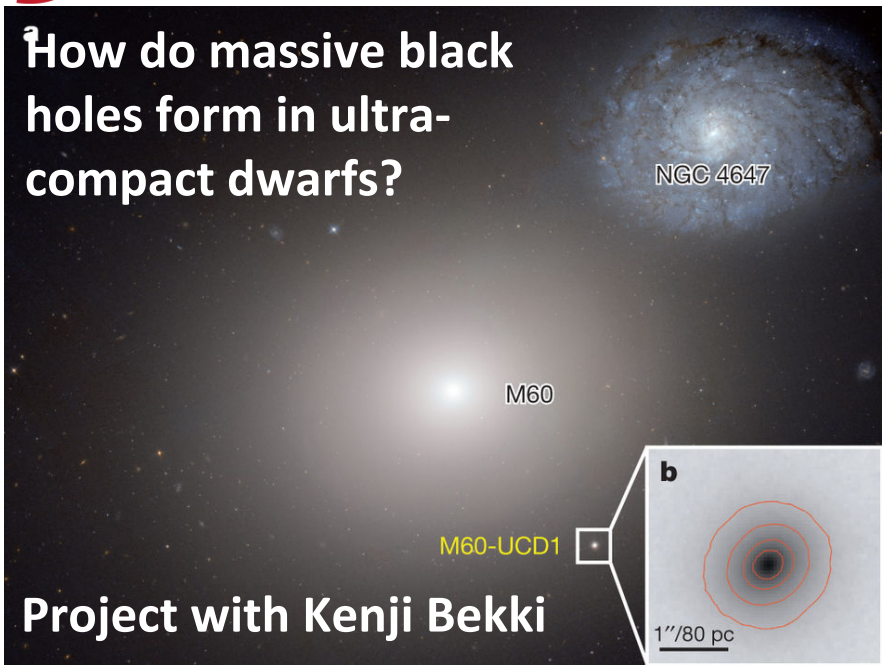
Government of Western Australia
Department of the Premier and Cabinet
Office of Science

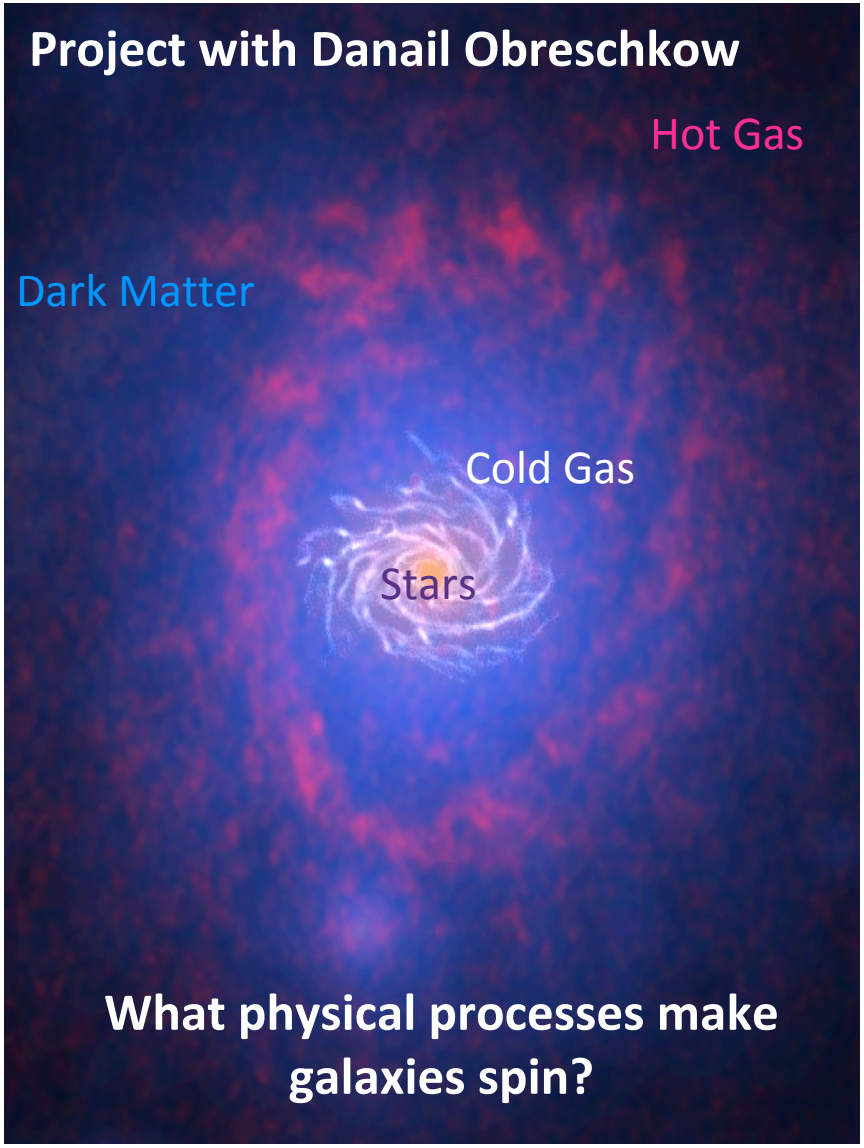
What do we do?



- Explore theories of **cosmology, dark matter**, and **galaxy formation**…
- … using state-of-the-art **supercomputer simulations** and sophisticated **theoretical models.**
- Create mock observables to test model predictions and support **galaxy survey science**
- Develop **novel algorithms** and **statistical tools** to analyse and interpret data

Problems in Galaxy Formation





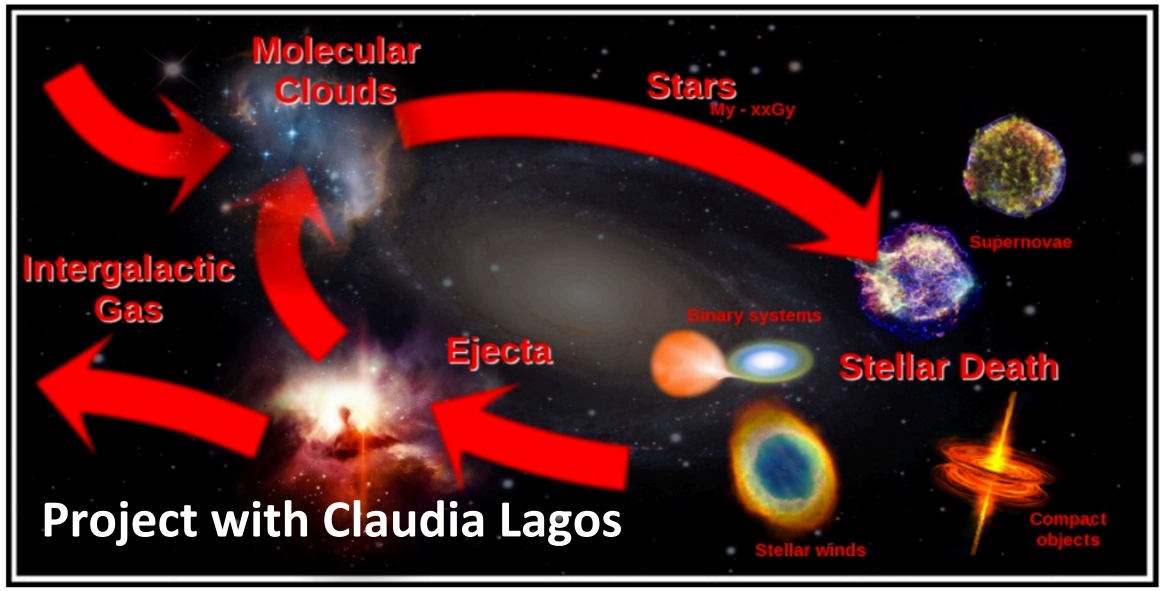
Do **super-massive black holes** grow in galaxies, or do galaxies grow around super-massive black holes?

Is **galaxy morphology** a product of nature or nurture?

Problems in Galaxy Evolution

How much of a **transformational** influence can **super-massive black holes** be on their host galaxies?

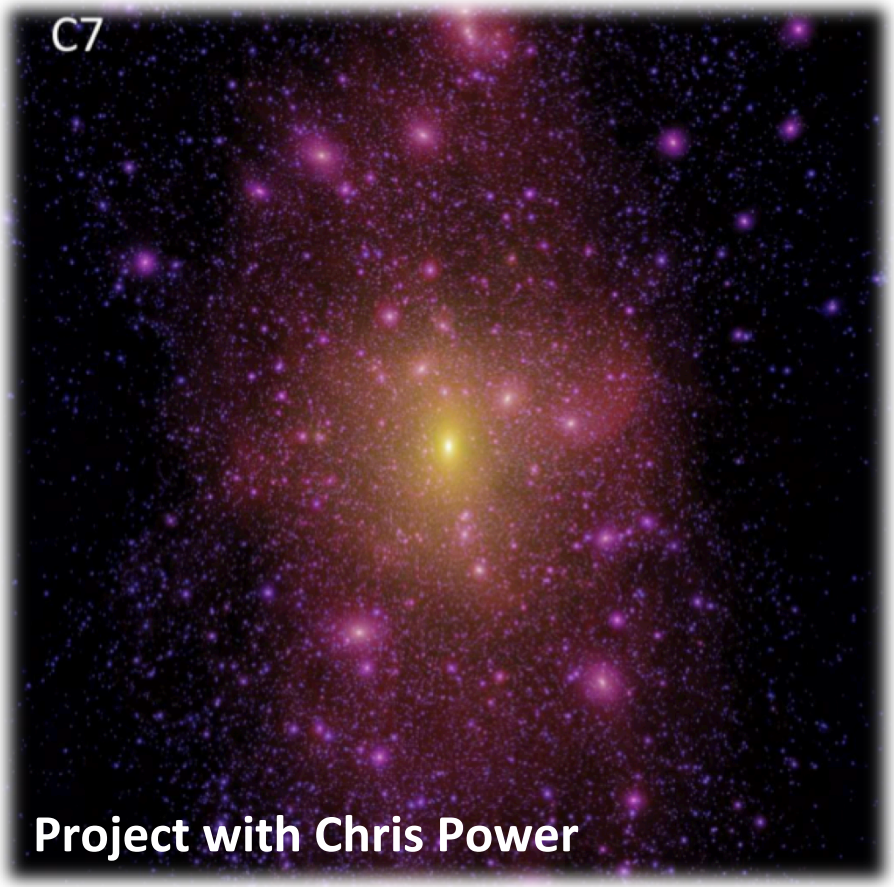
How do the **chemical elements**, yielded by the stars that forge them in their interiors, **enrich their host galaxies**?



Problems in Dark Matter

How does **dark matter** influence the **observable properties of galaxies**?

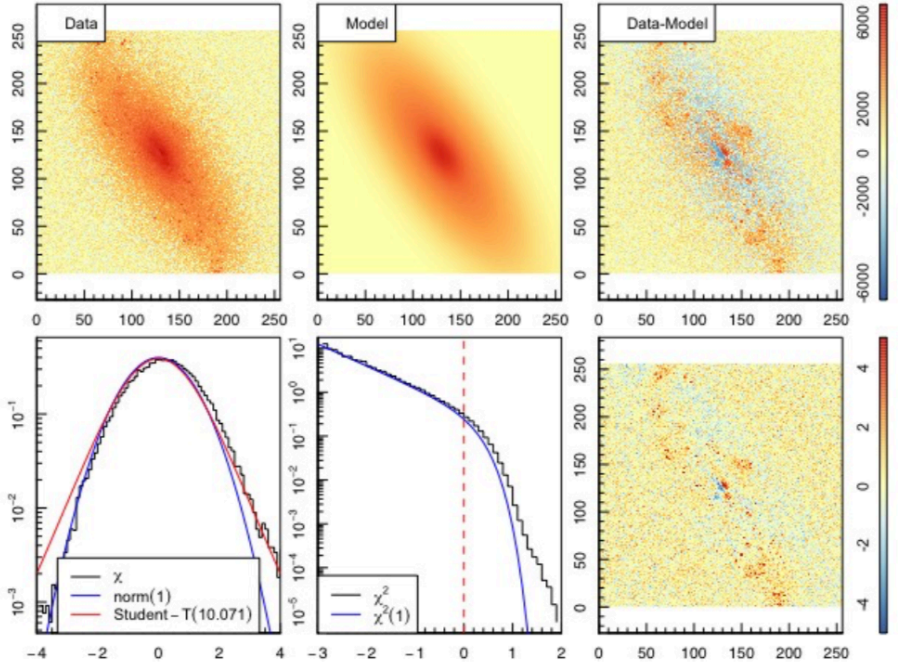
Can we use the stars around galaxies to **test our theories of dark matter**?



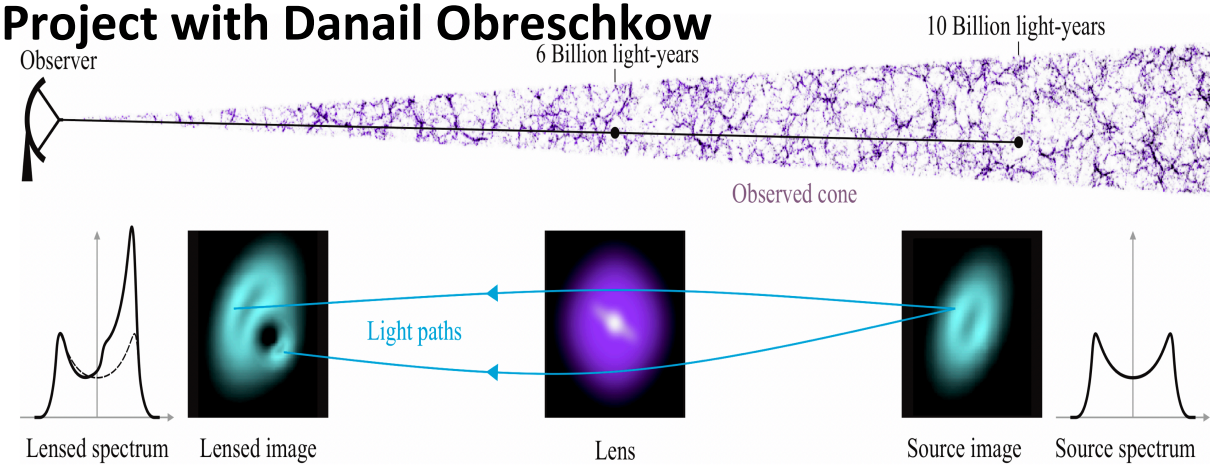
Problems in Modelling

Project with Claudia Lagos & Aaron Robotham

What can **galaxy structure** tell us about the **physics of galaxy formation**?



Project with Danail Obreschkow



How can we explore **dark matter and distant galaxies** through **gravitationally lensed radio signals**?