

# The All-Sky Virtual Observatory - SAGE and the Theoretical Astrophysical Observatory

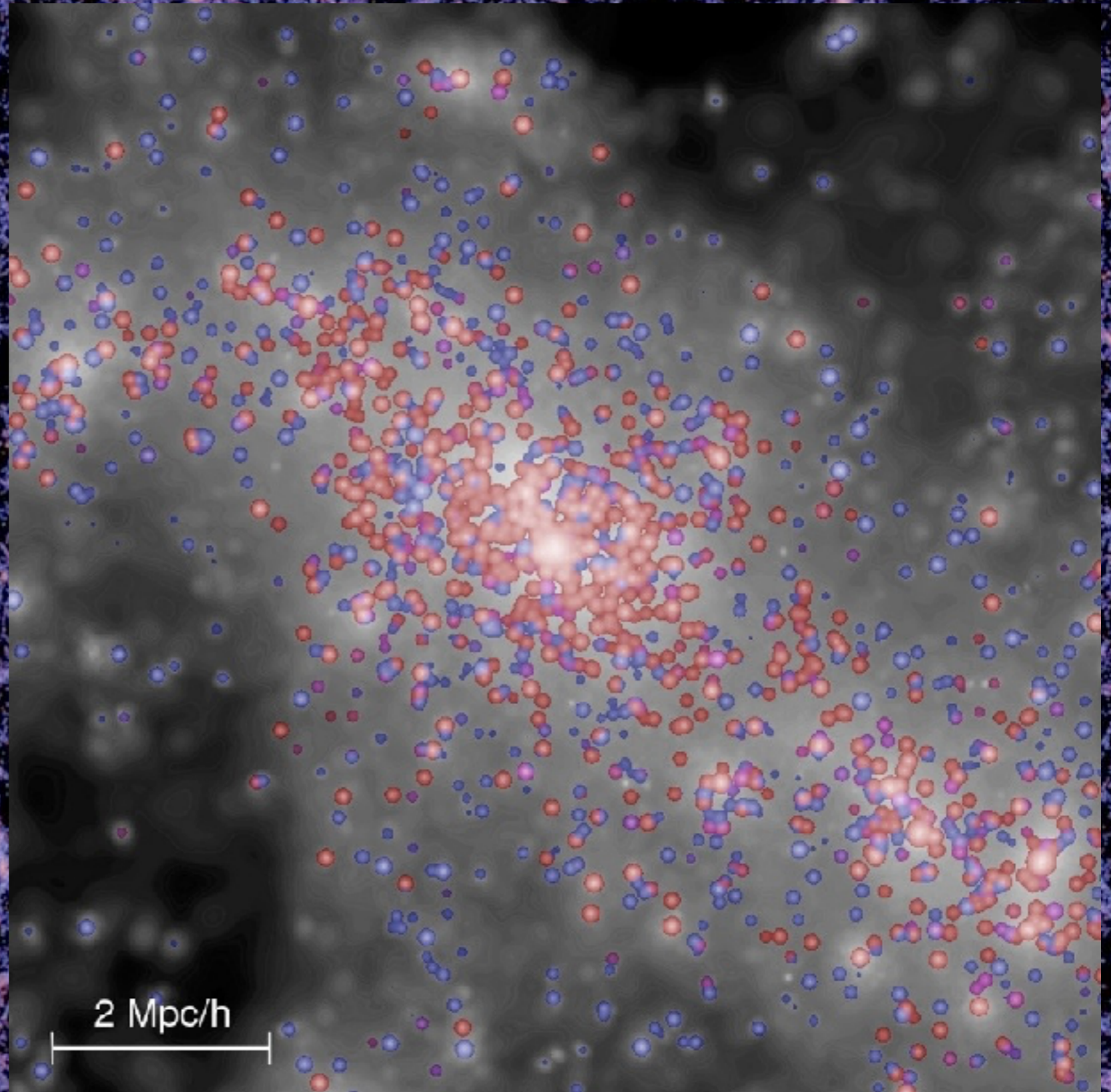
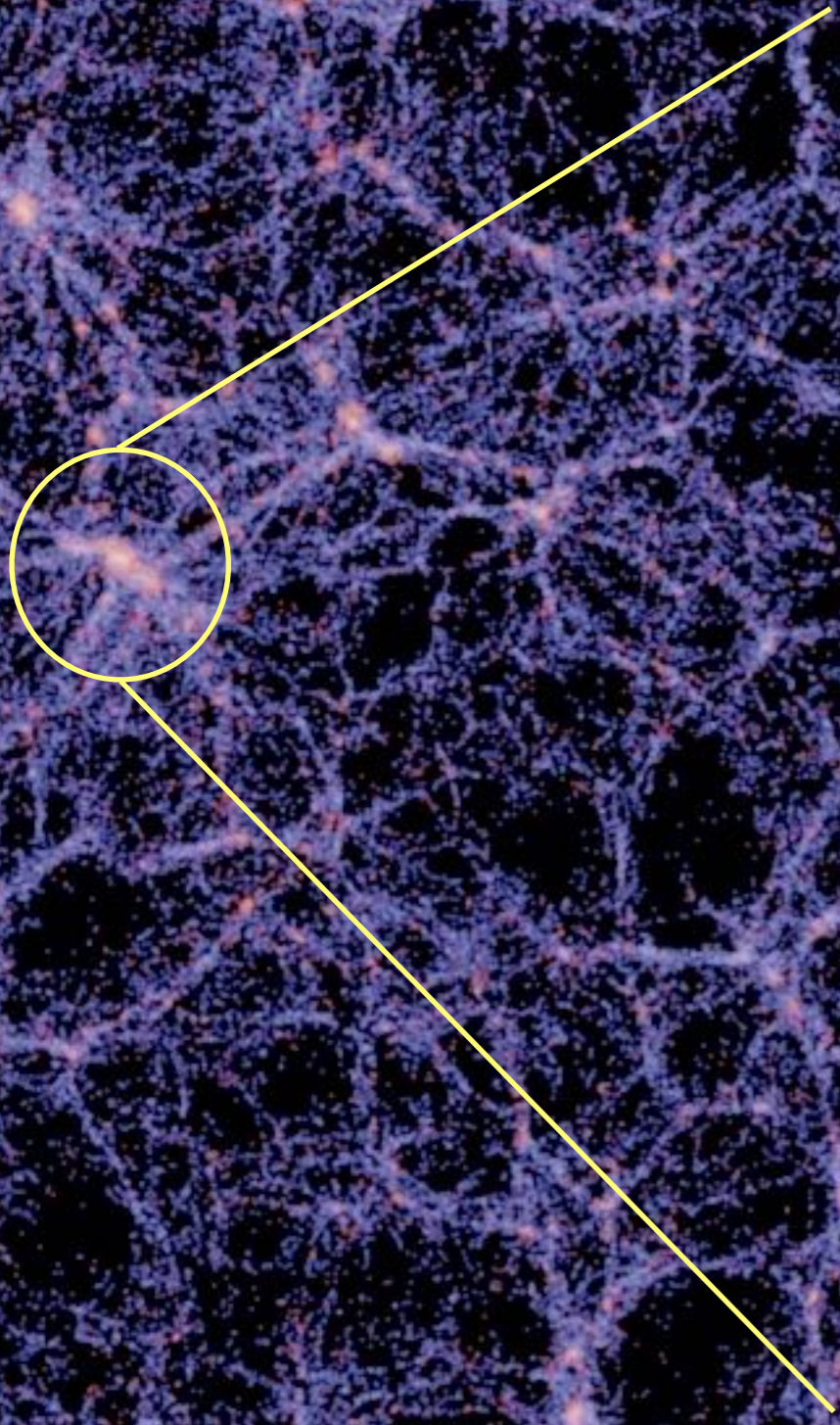
Darren Croton

Centre for Astrophysics and Supercomputing  
Swinburne University of Technology

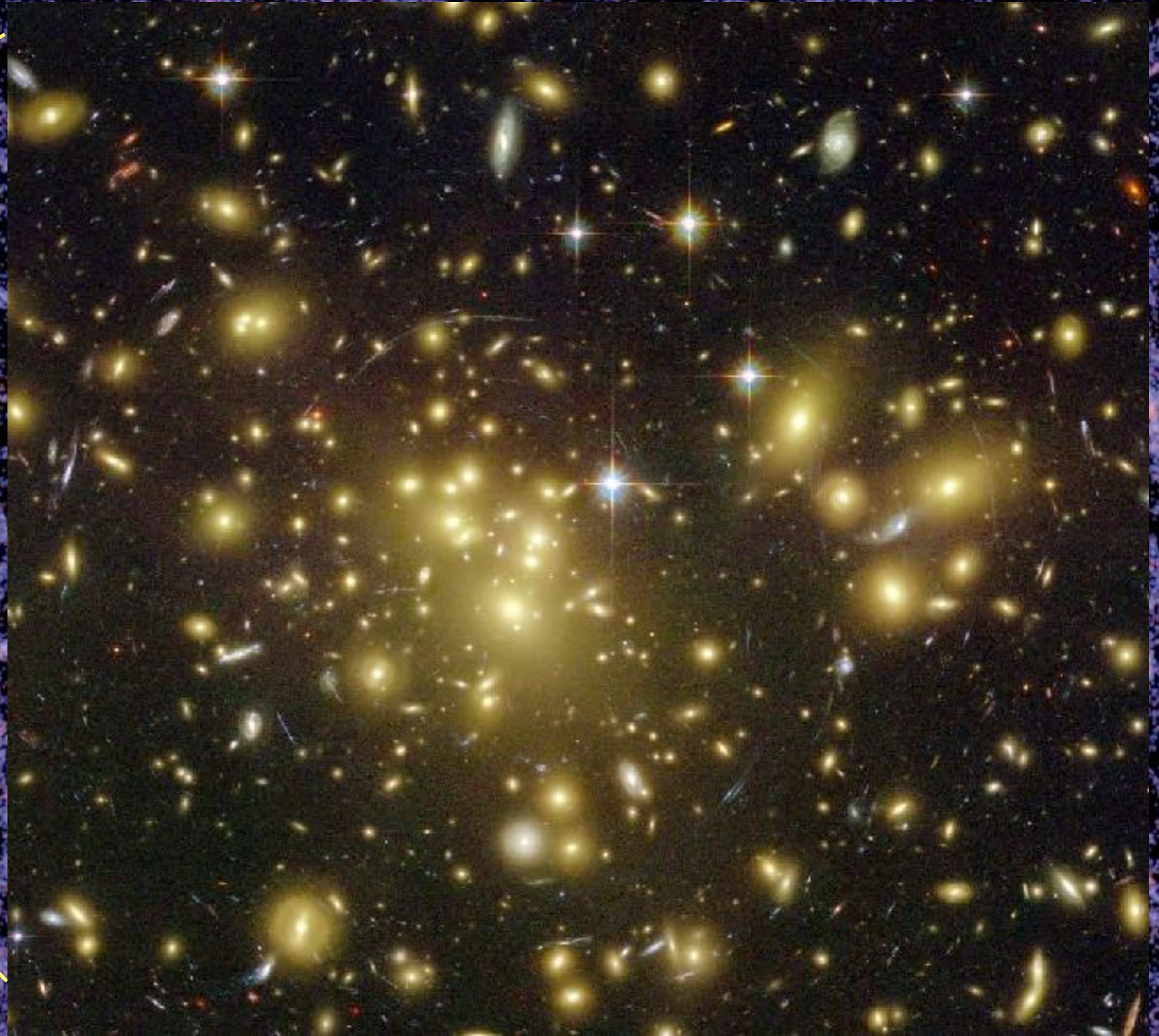
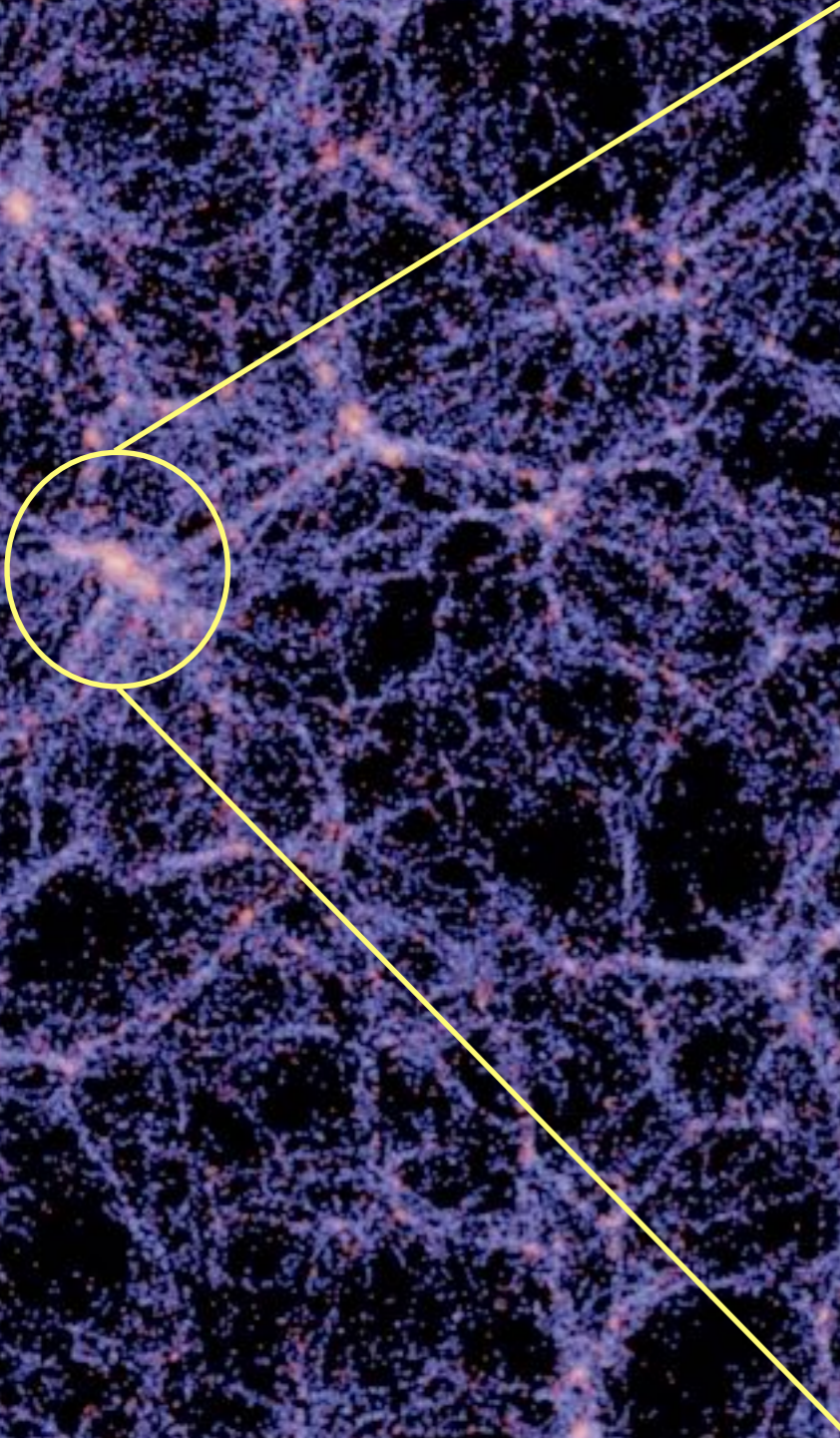
A NeCTAR / Astronomy Australia Limited / Swinburne University  
funded project

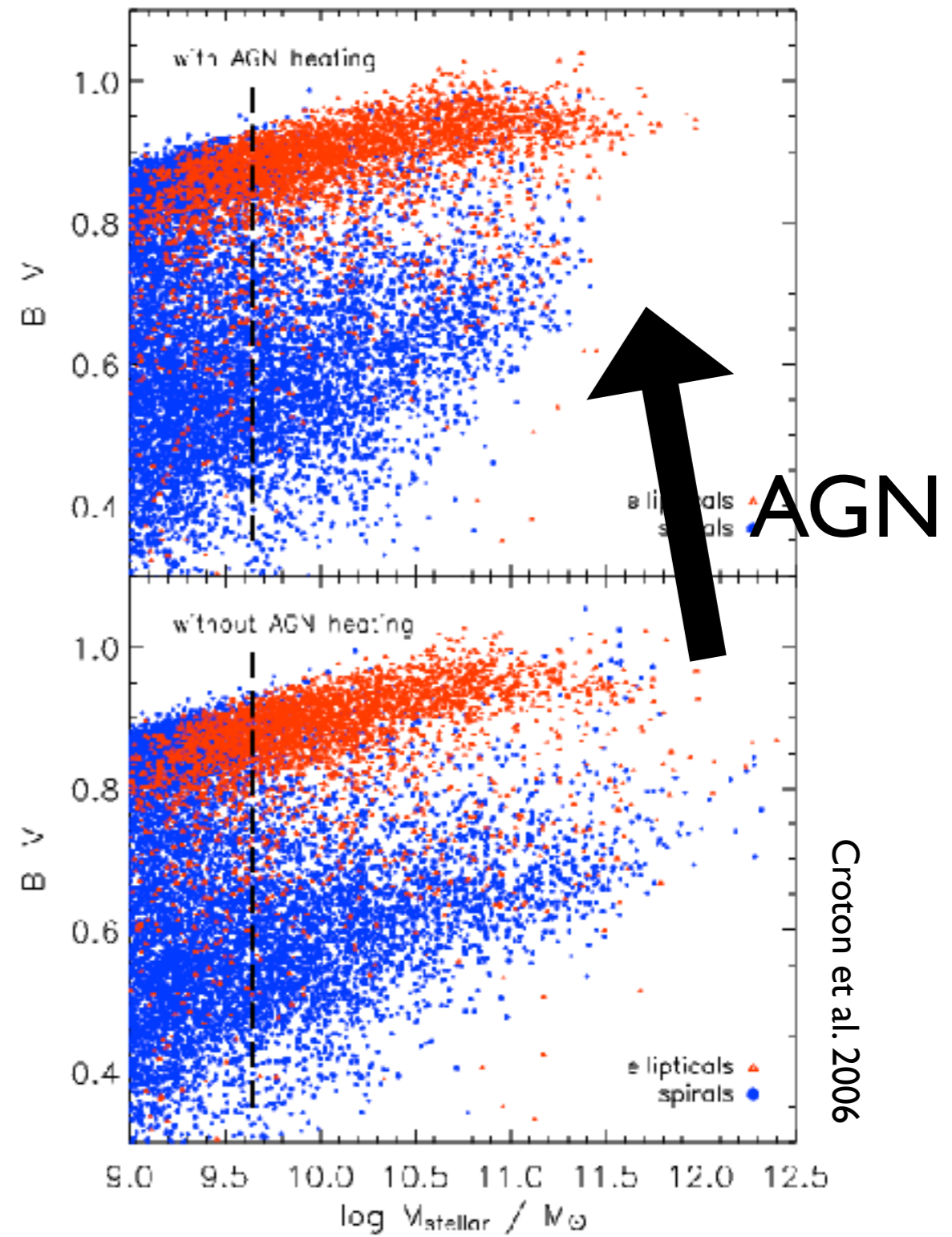
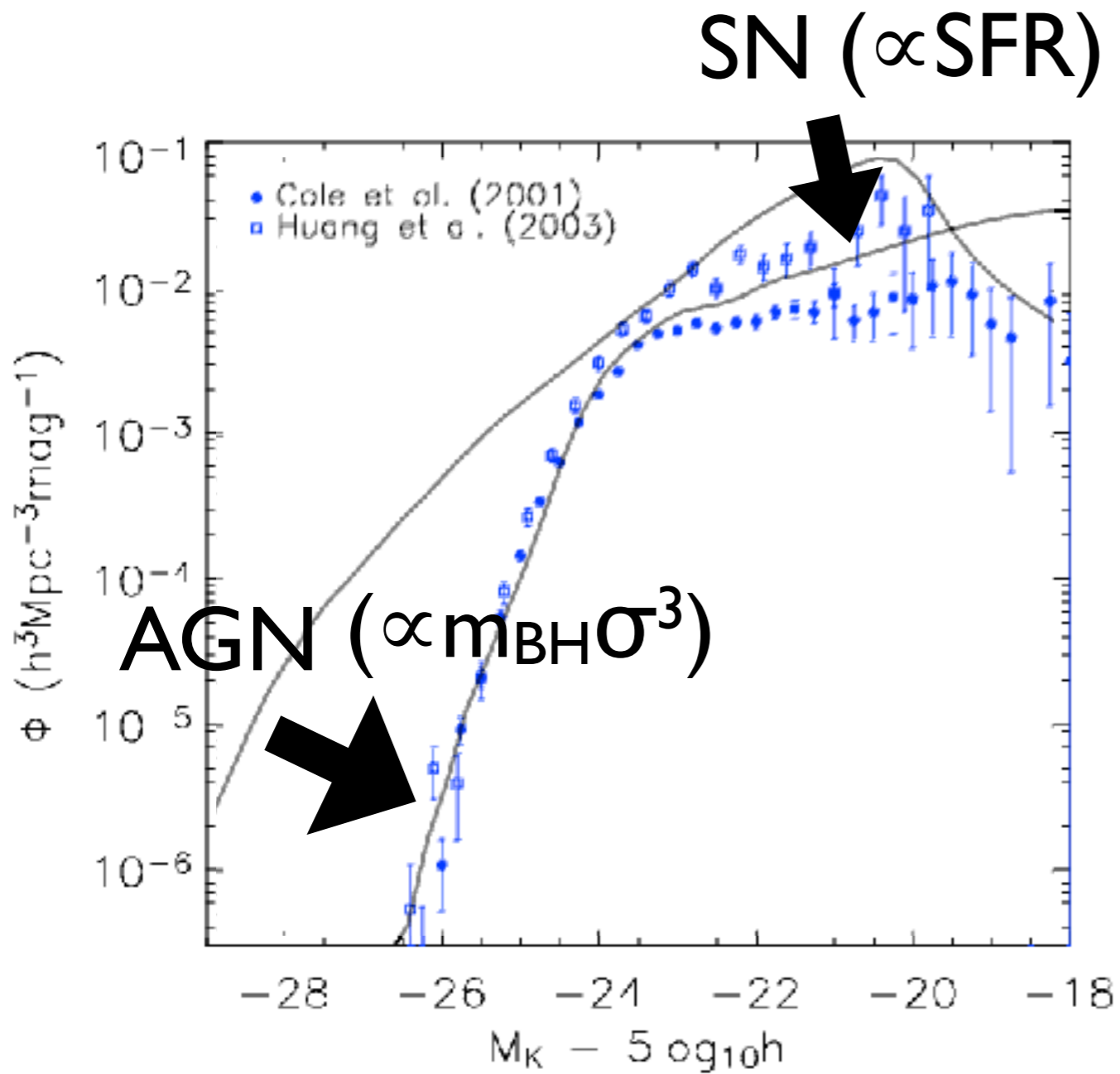


# simulated dark matter + galaxy formation model



simulated dark matter + galaxy formation model





Croton et al. 2006

# SAGE: Semi-Analytic Galaxy Evolution

Croton et al., ApJS, 2016

Goal: release a publicly available semi-analytic codebase that is ...

... fast, clean, modular

... easy to install and use

... can run on multiple simulations

<https://github.com/darrencroton/sage>

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# Virgo - Millennium Database

Documentation

CREDITS/Acknowledgments

Registration

News

FAQ

Public Databases

+ DGalaxies

+ DHalotrees

+ Guo2010a

+ MField

+ MillenniumII

+ millimil

+ miniMilII

+ MMSnapshots

+ MPAGalaxies

+ MPAHaloTrees

+ MPAMocks

Private (MyDB) Databases

darren\_db (rw) (context)



Welcome Darren Croton.

Streaming queries return unlimited number of rows in CSV format and are cancelled after 420 seconds.

Browser queries return maximum of 1000 rows in HTML format and are cancelled after 30 seconds.

Query (stream)

Query (browser)

Help

Maximum number of rows to return to the query form:

**Demo queries:** click a button and the query will show in the query window.

Holding the mouse over the button will give a short explanation of the goal of the query. These queries are also available on [this page](#).

Mainly Halos:

Mainly Galaxies:

**Metadata queries:** The SQL statements under these buttons provide examples for querying and managing the state of a private database. Holding the mouse over the button will give a short explanation of the goal of the statement.

ShowTables

Show Views

Show Columns

Show Indexes

MyDB Size

MyDB Table Size

Create View

Drop Table

Create Index



TAO

Telescope simulator

Image generation

Light cone generation

SEDs + Filters

Web form data query

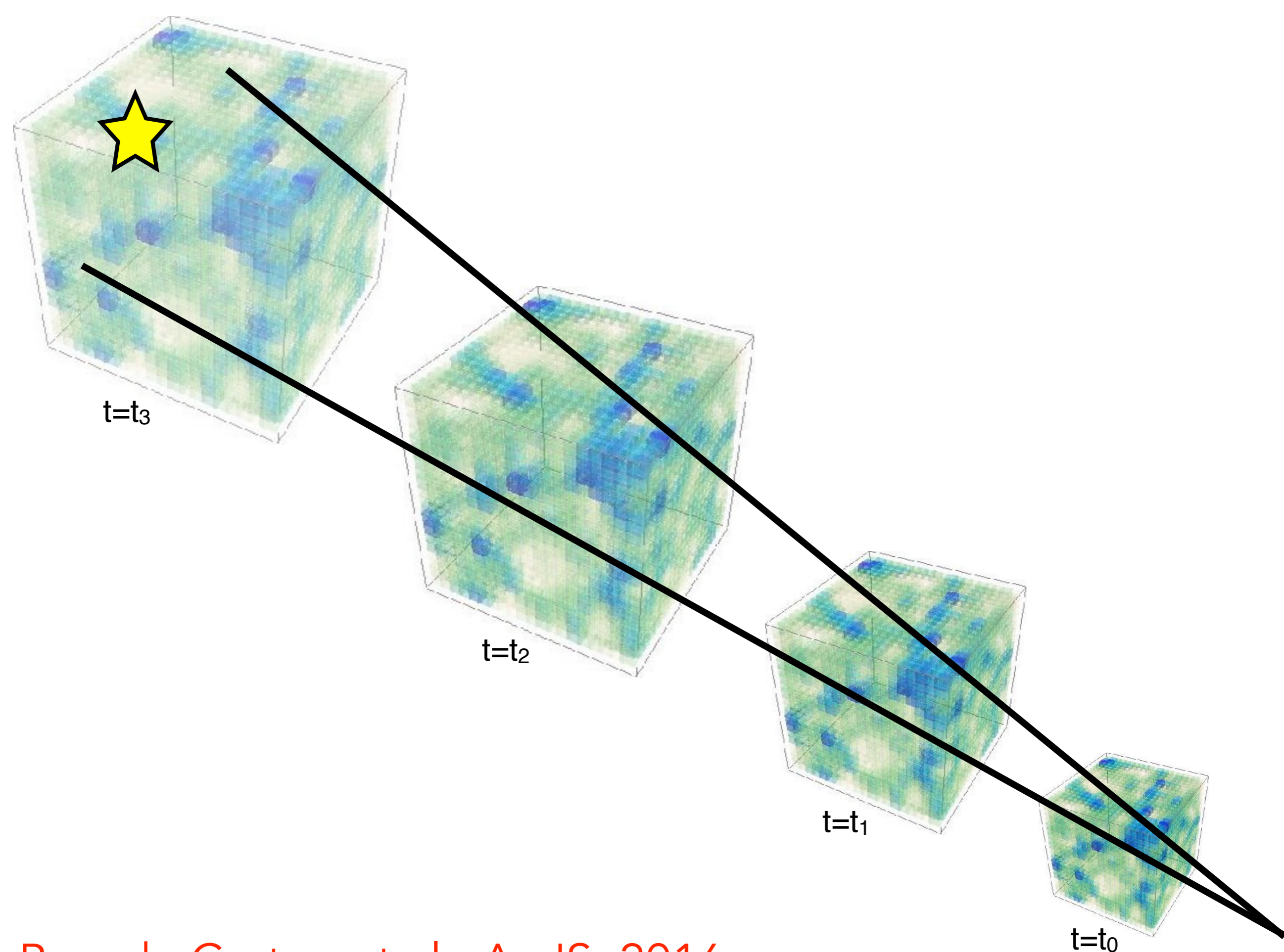
Simulation database

GAVO

SQL data query

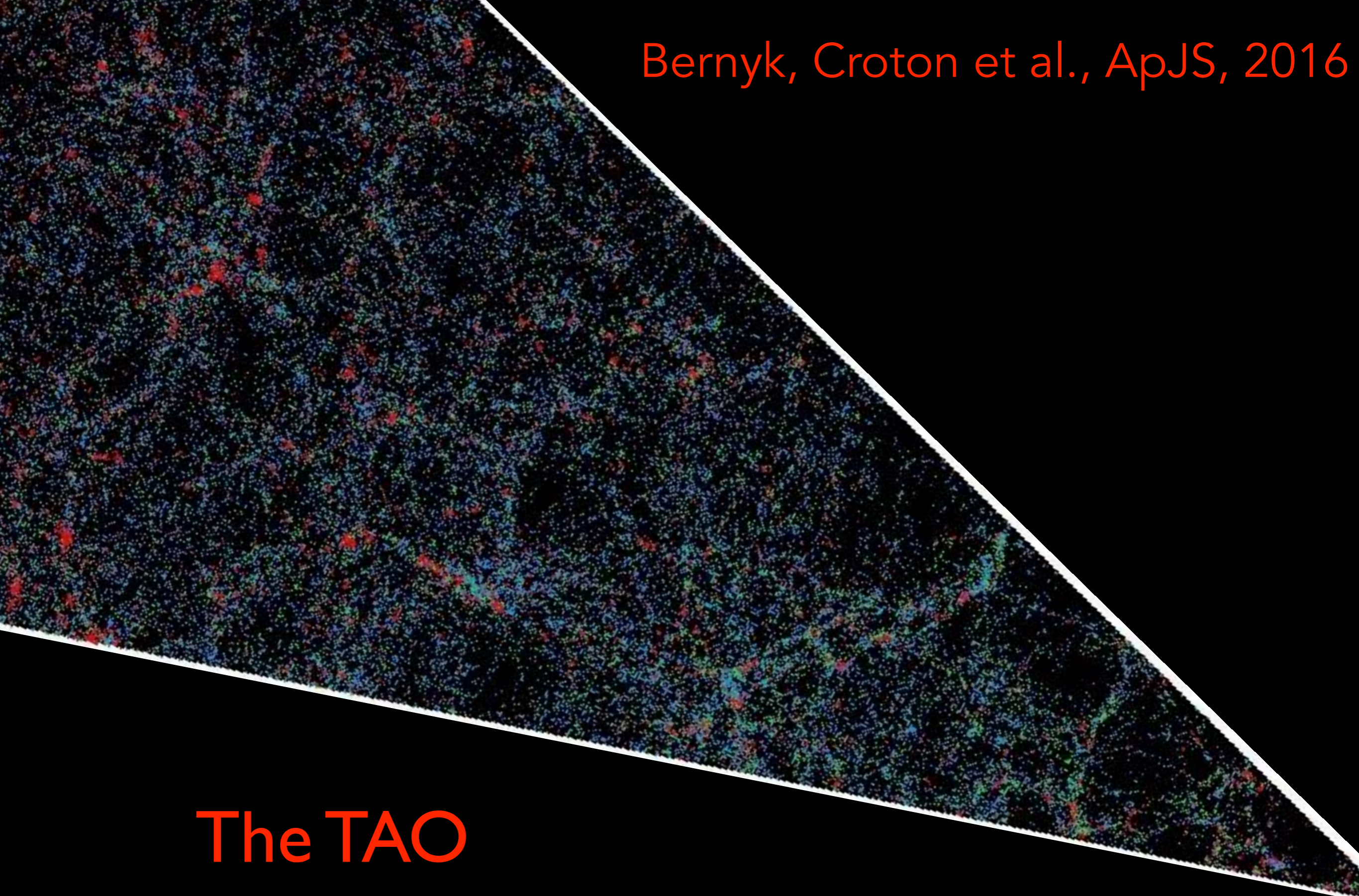
Simulation database

<https://tao.asvo.org.au>



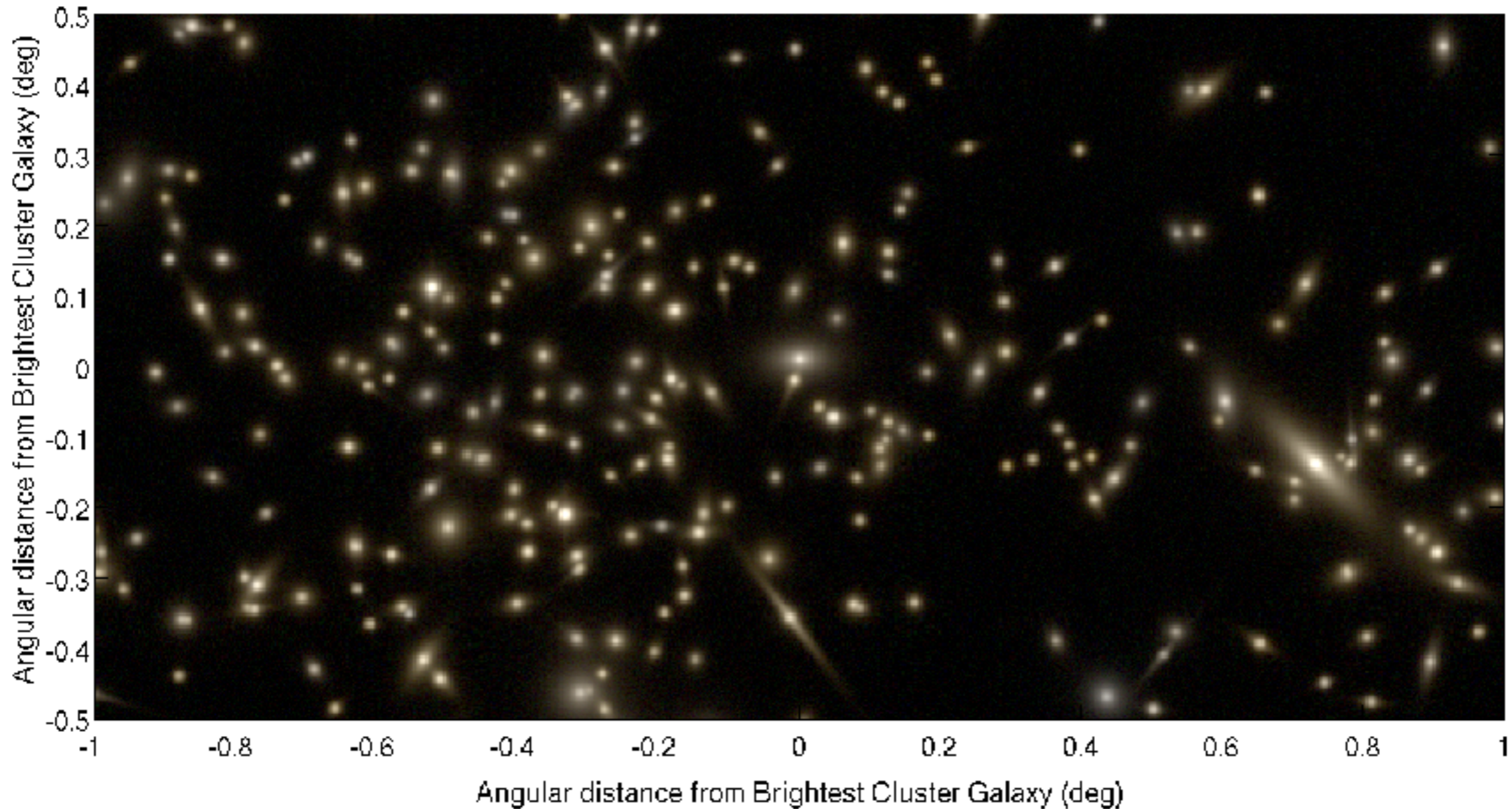
Bernyk, Croton et al., ApJS, 2016

Bernyk, Croton et al., ApJS, 2016



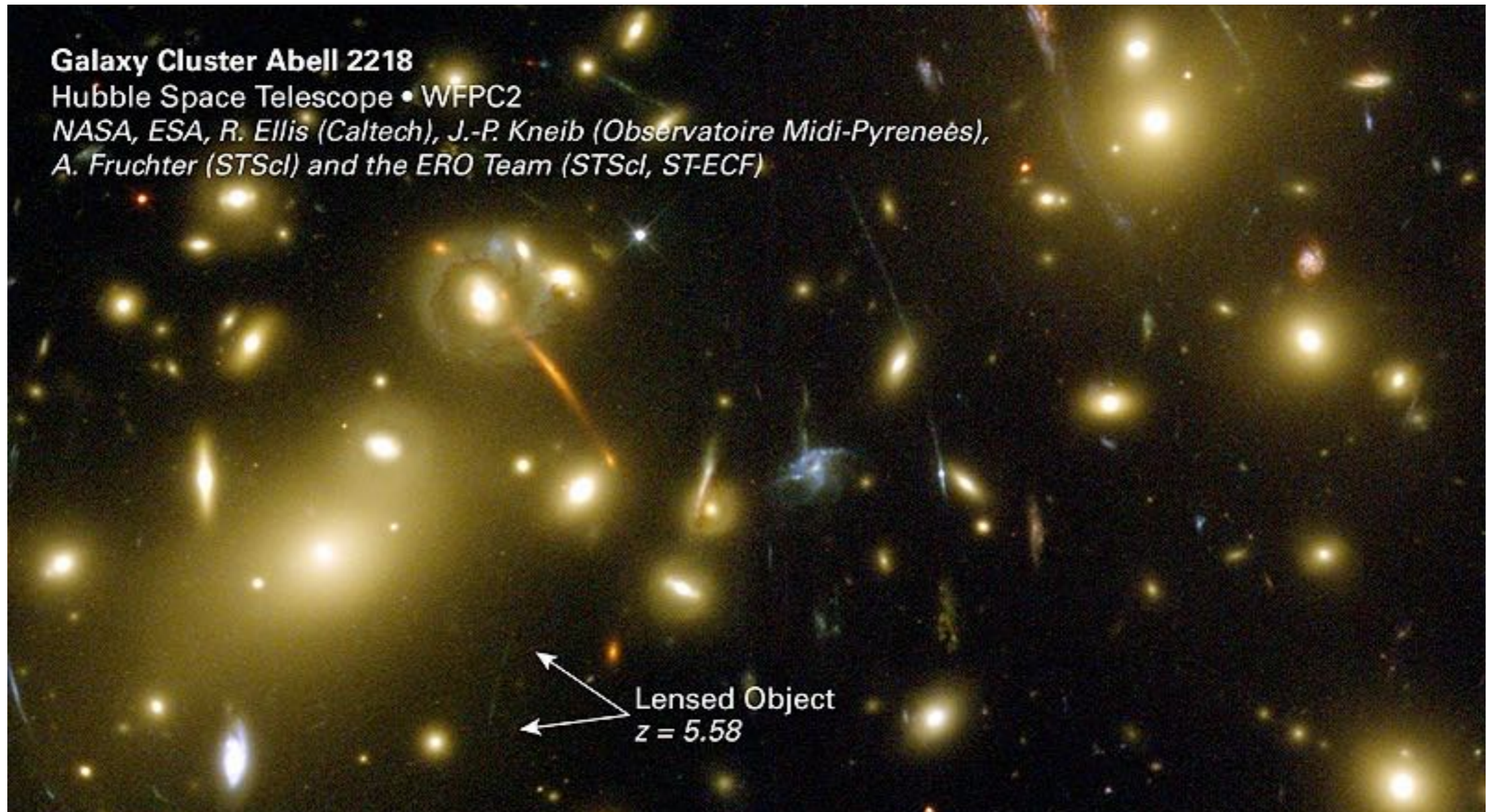
The TAO  
light-cone module

# The TAO image module



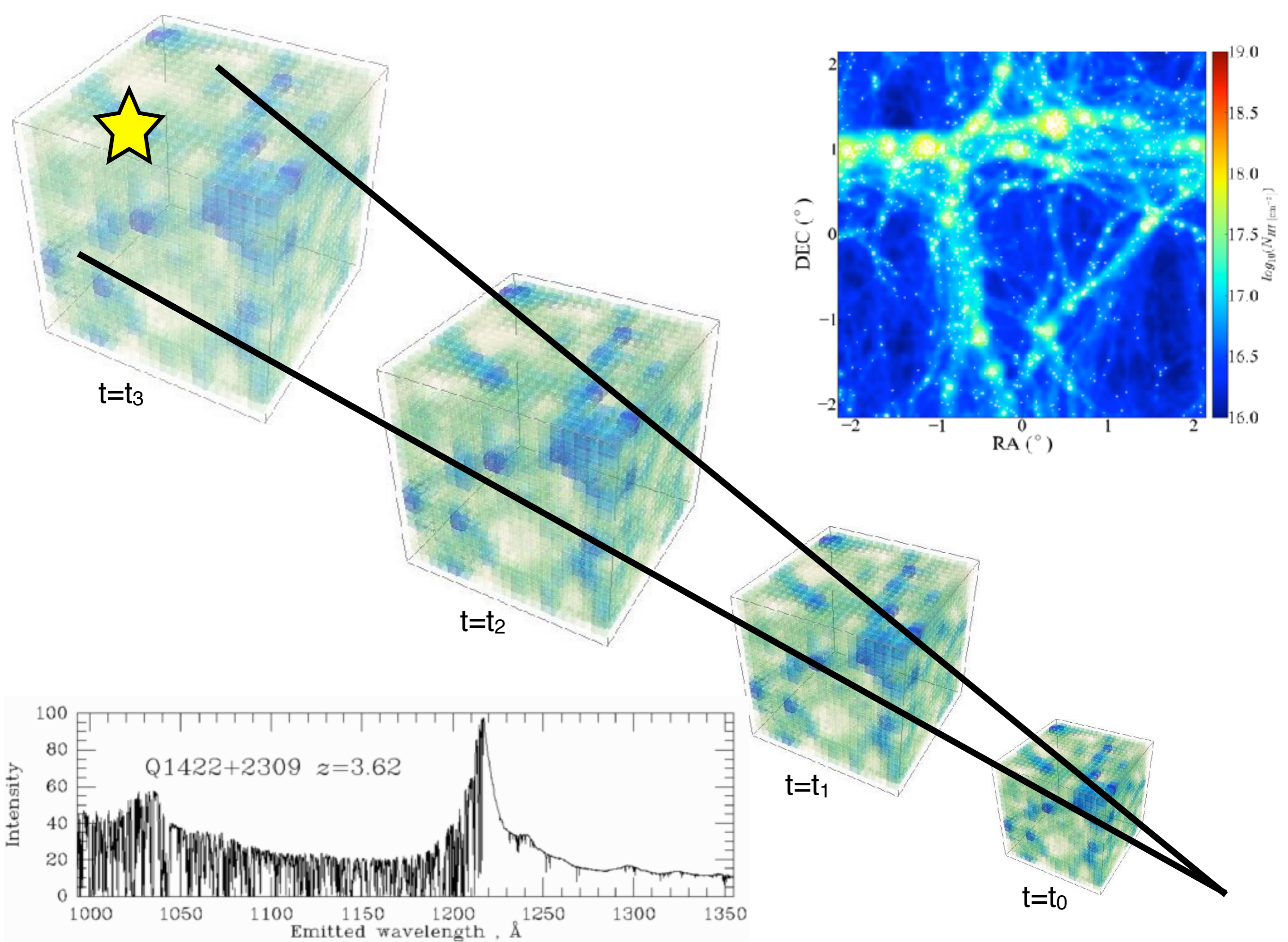
Bernyk, Croton et al., ApJS, 2016

# The TAO image module



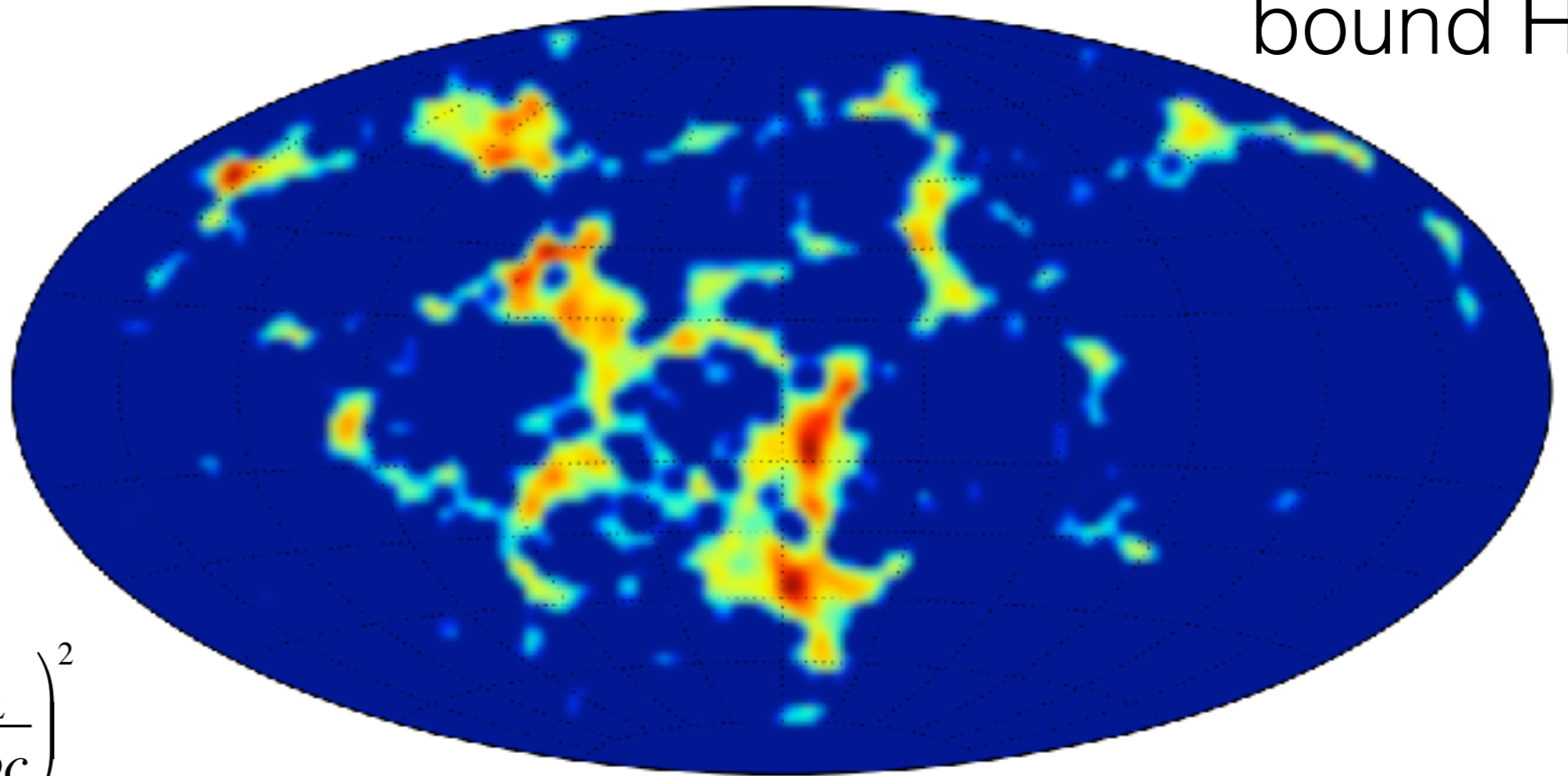
Bernyk, Croton et al., ApJS, 2016

<https://tao.asvo.org.au>



# All-Sky HI Maps

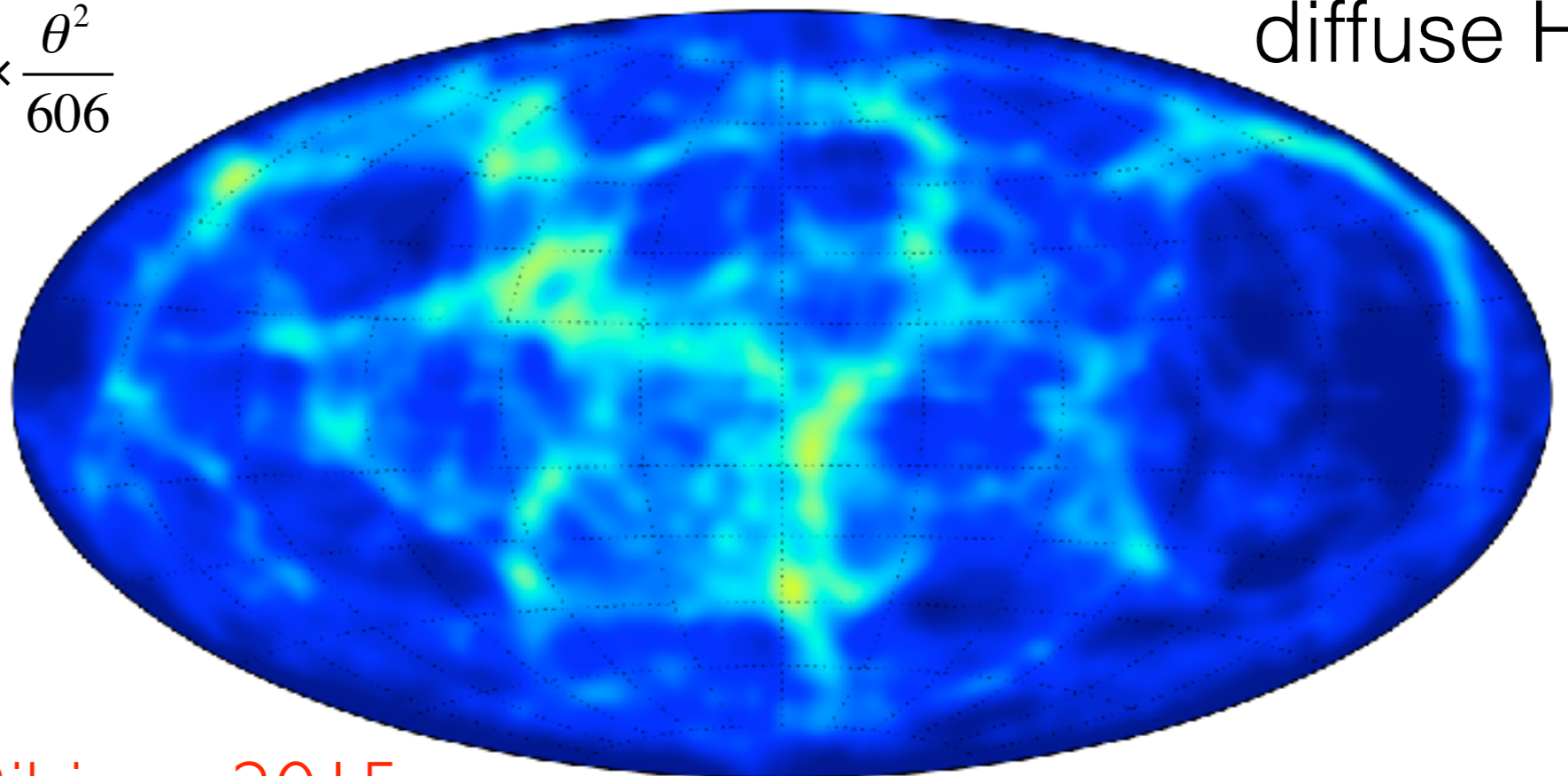
bound HI



$$\frac{M_{HI}}{M_{\odot}} = \frac{236}{1+z} \times \frac{S_{\text{int}}}{\text{mJy km s}^{-1}} \left( \frac{D_L}{\text{Mpc}} \right)^2$$

diffuse HI

$$\frac{S_{\text{int}}}{\text{mJy km s}^{-1}} = \frac{N_{HI}}{1.823 \times 10^{18} \text{ cm}^{-2}} \times \frac{\theta^2}{606}$$





SAGE in Github:

<https://github.com/darrencroton/sage>

Croton et al. 2016

Models in TAO:

<https://tao.asvo.org.au>

Bernyk et al. 2016

The TAO project is part of the ASVO NeCTAR Virtual Laboratory, supported by

Swinburne University, Astronomy Australia Limited, and the Commonwealth Government

through ANDS/NeCTAR/RDS NCRIS and EIF funding

<http://tao.asvo.org.au>

<http://www.asvo.org.au>

<https://www.nectar.org.au/all-sky-virtual-observatory>