

Wide-field, multi-wavelength data for Abell 2744

HST Frontier Fields workshop
Yale University, New Haven
Nov 13, 2014

Julian Merten
JPL / Caltech



JPL

Collaborators (this work)

Matthias Bartelmann / ITA Heidelberg

Bengt Fornberg / UCol Boulder

Elinor Medezinski / JHU

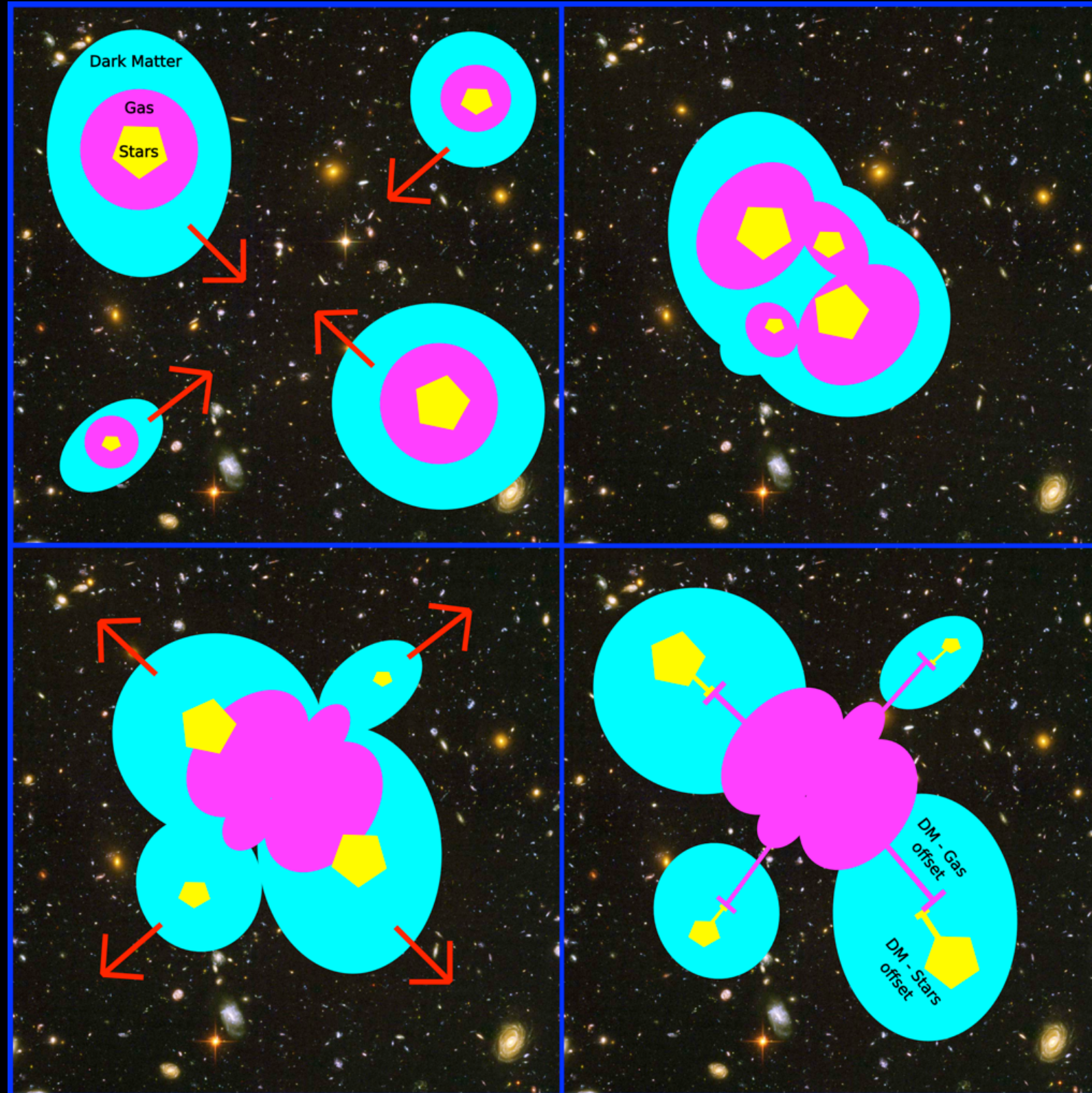
Leonidas Moustakas / JPL

Nobuhiro Okabe / IPMU

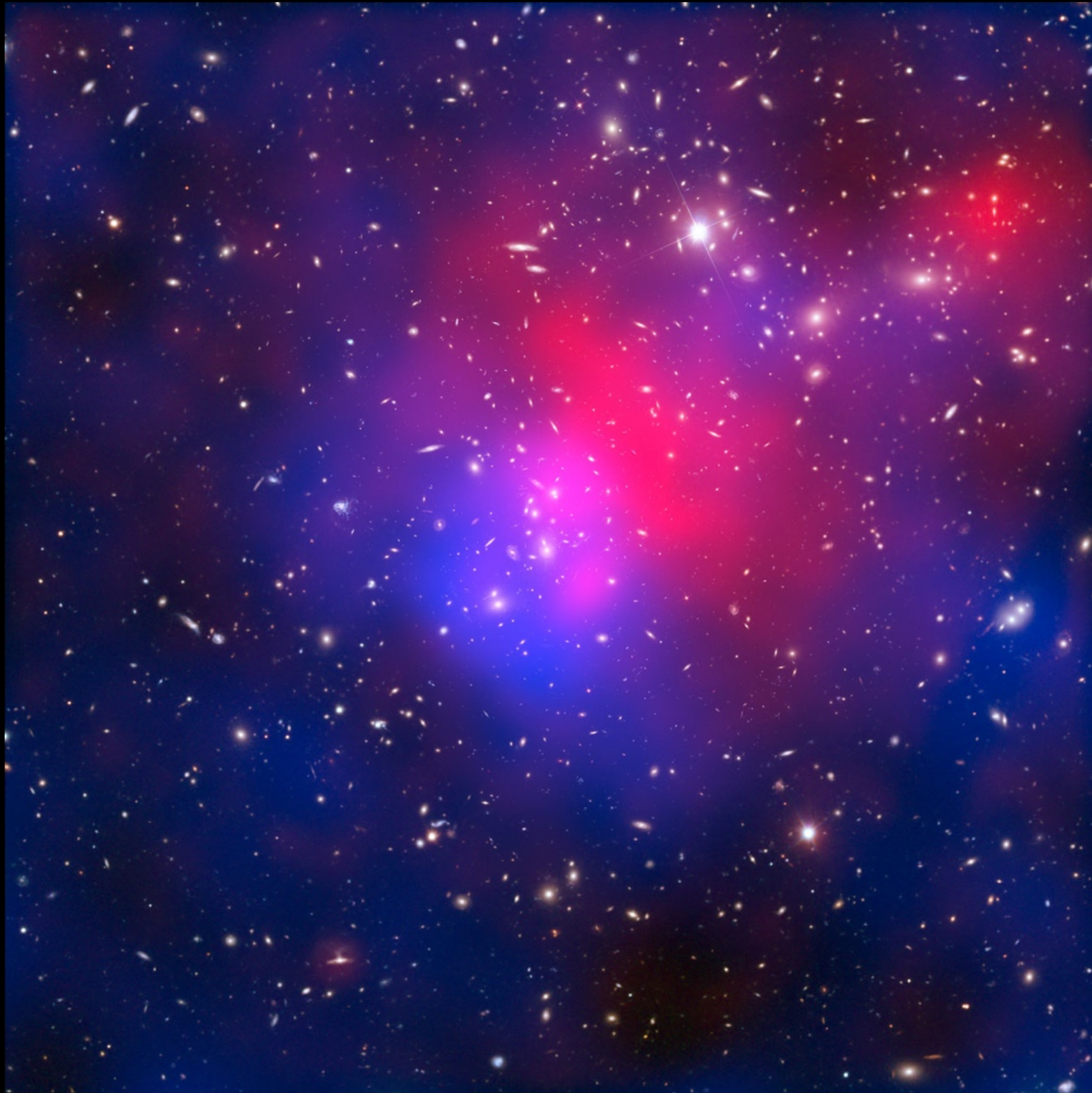
Jack Sayers / Caltech

Keiichi Umetsu / ASIAA

Cosmic colliders

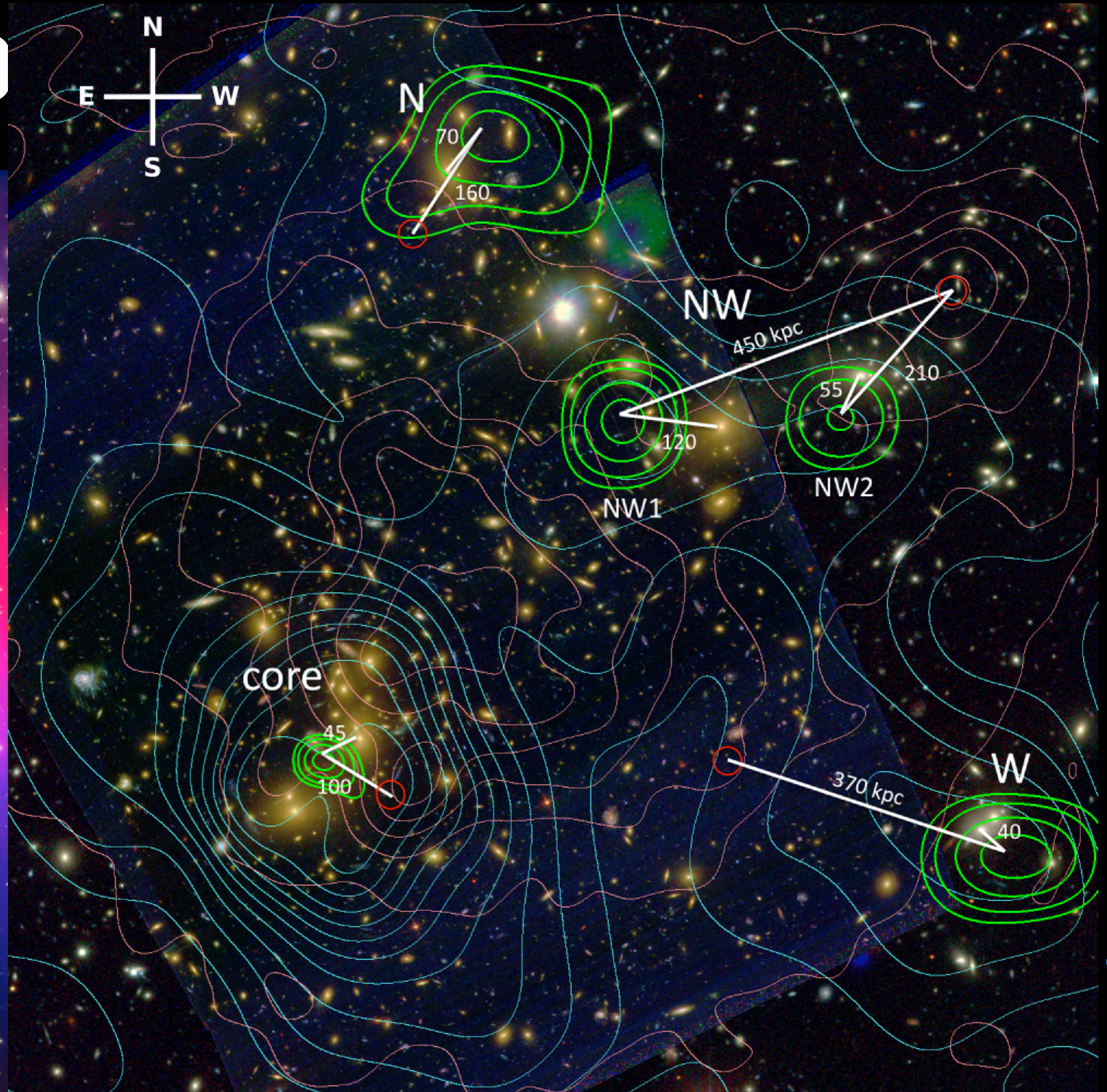


The case of Abell 2744



Abell 2744
Merten et al. 2011
Image credits:
NASA, ESA, ESO, CXO,
J. Merten & D. Coe

The case of

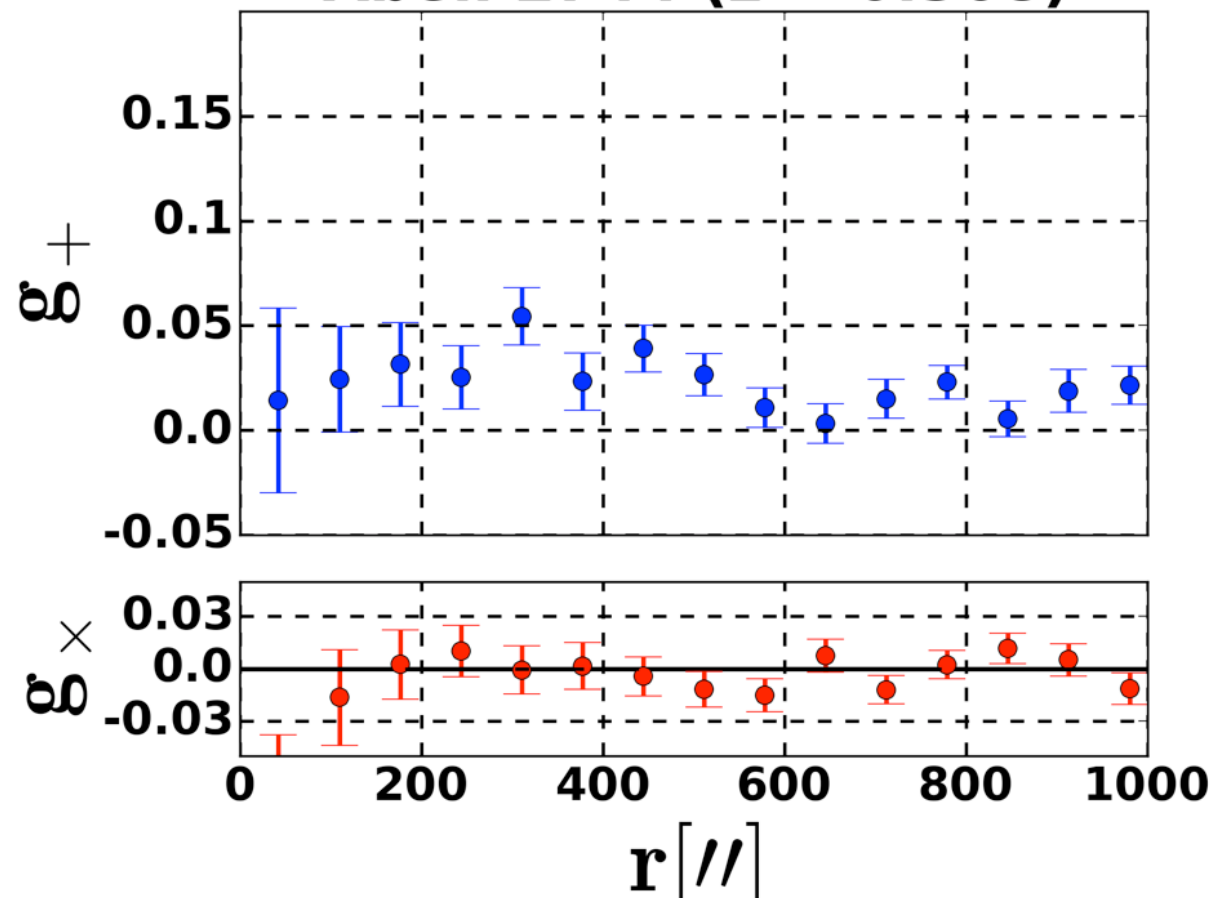


**NASA, ESA, ESO, CXO,
J. Merten & D. Coe**

New Subaru data

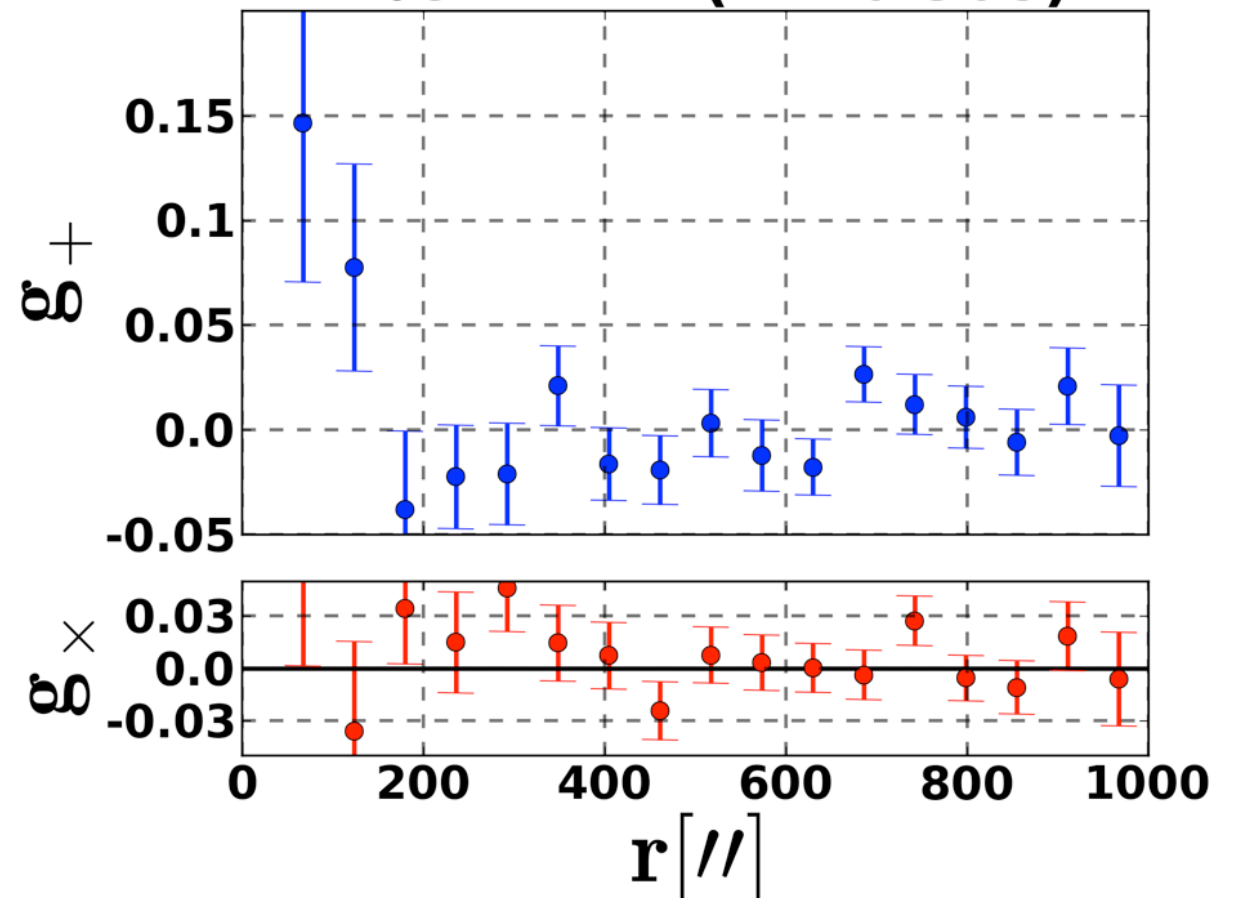
Based on, 0.8'' seeing, BRz, SuprimeCam data, PI:
Nobuhiro Okabe, HSC reduction pipeline,
Umetsu KSB+ pipeline, Medezinski CC-selection

Abell 2744 ($z = 0.308$)



old

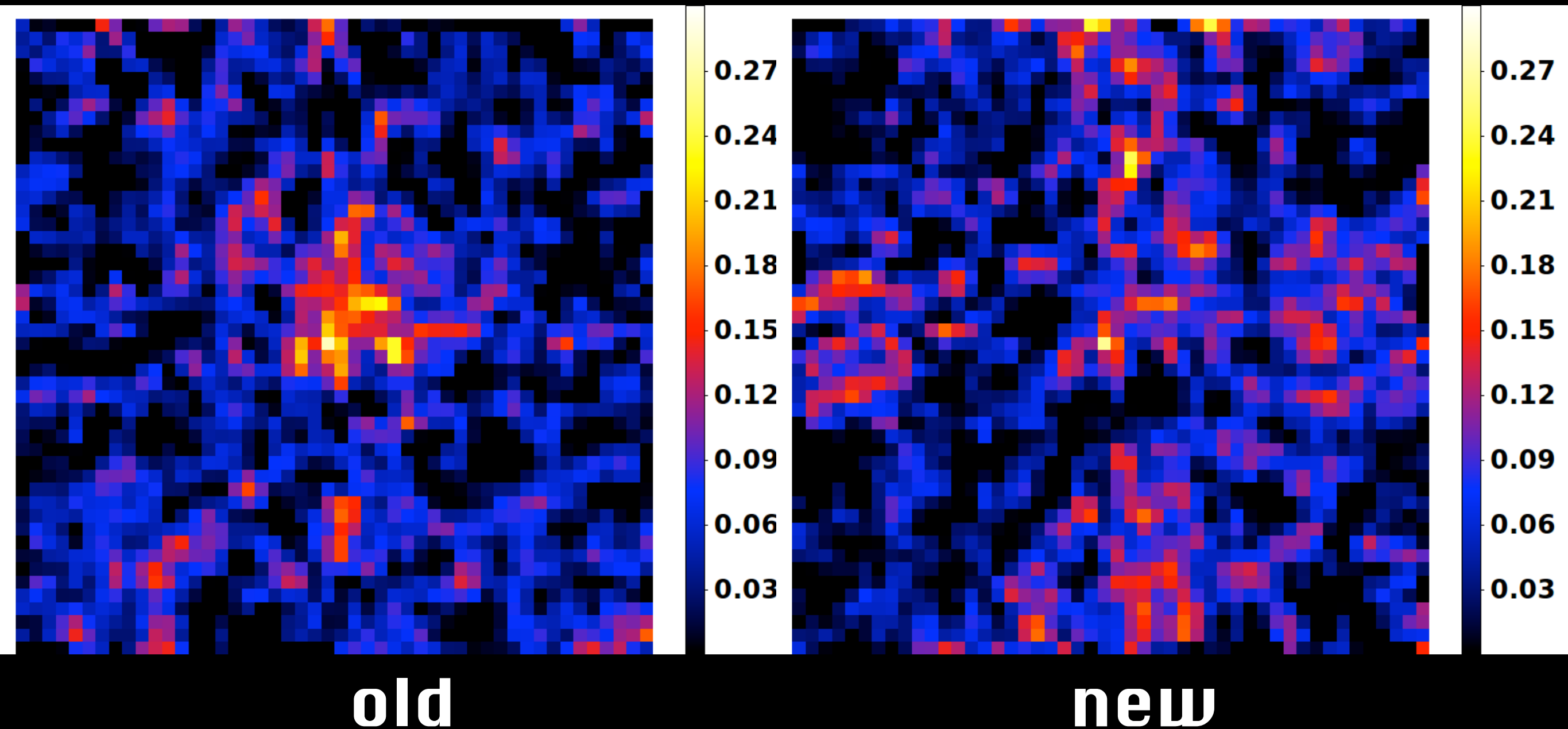
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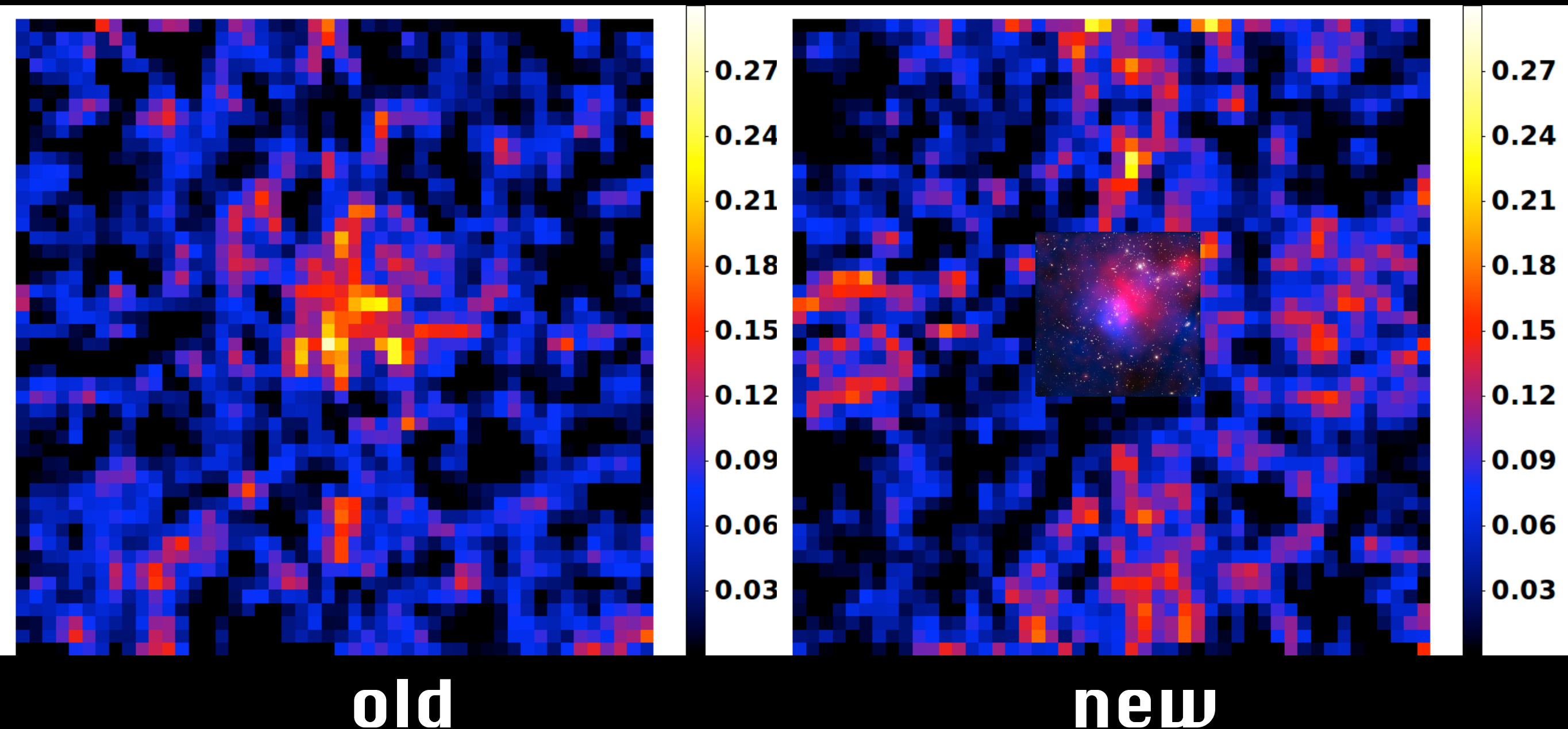
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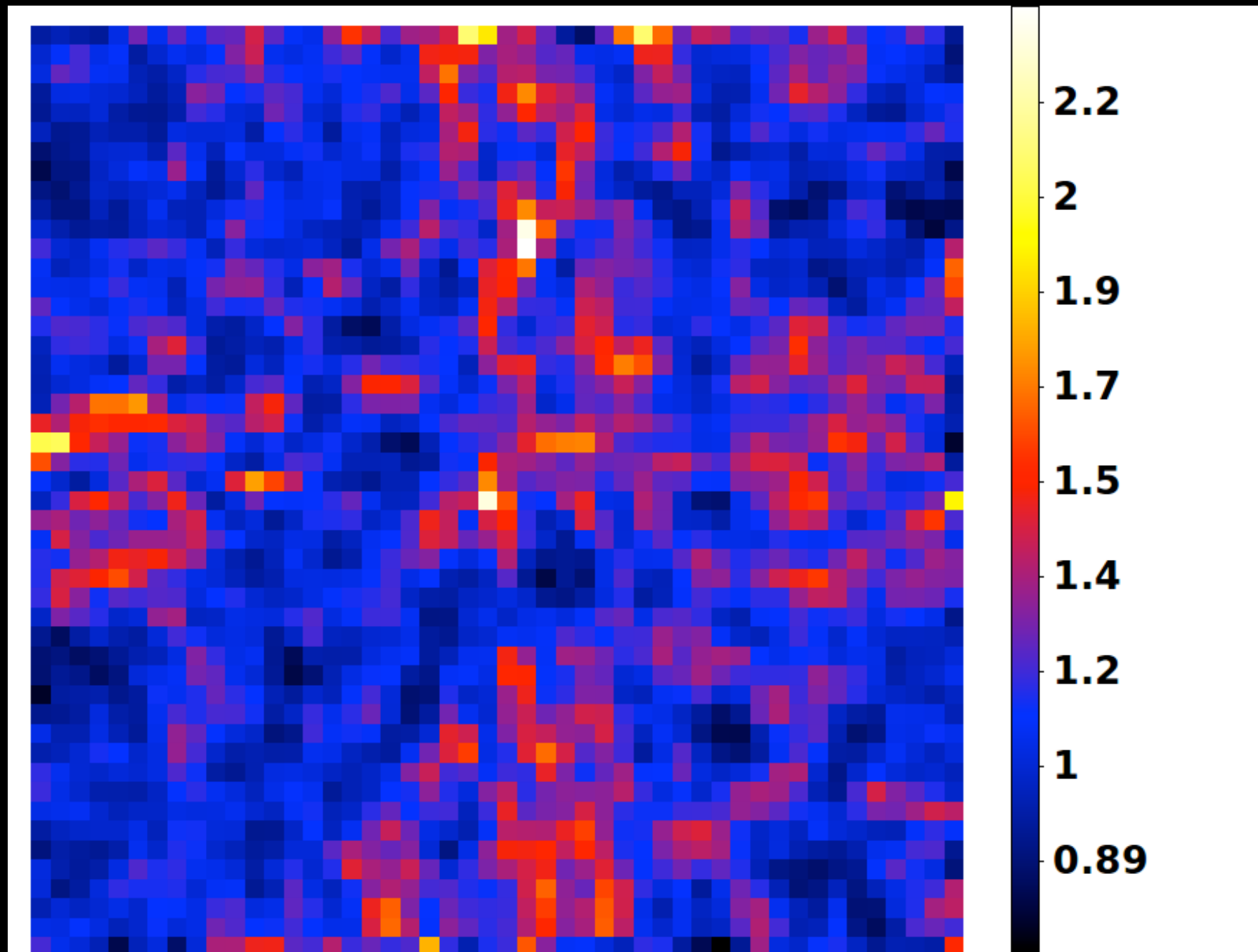


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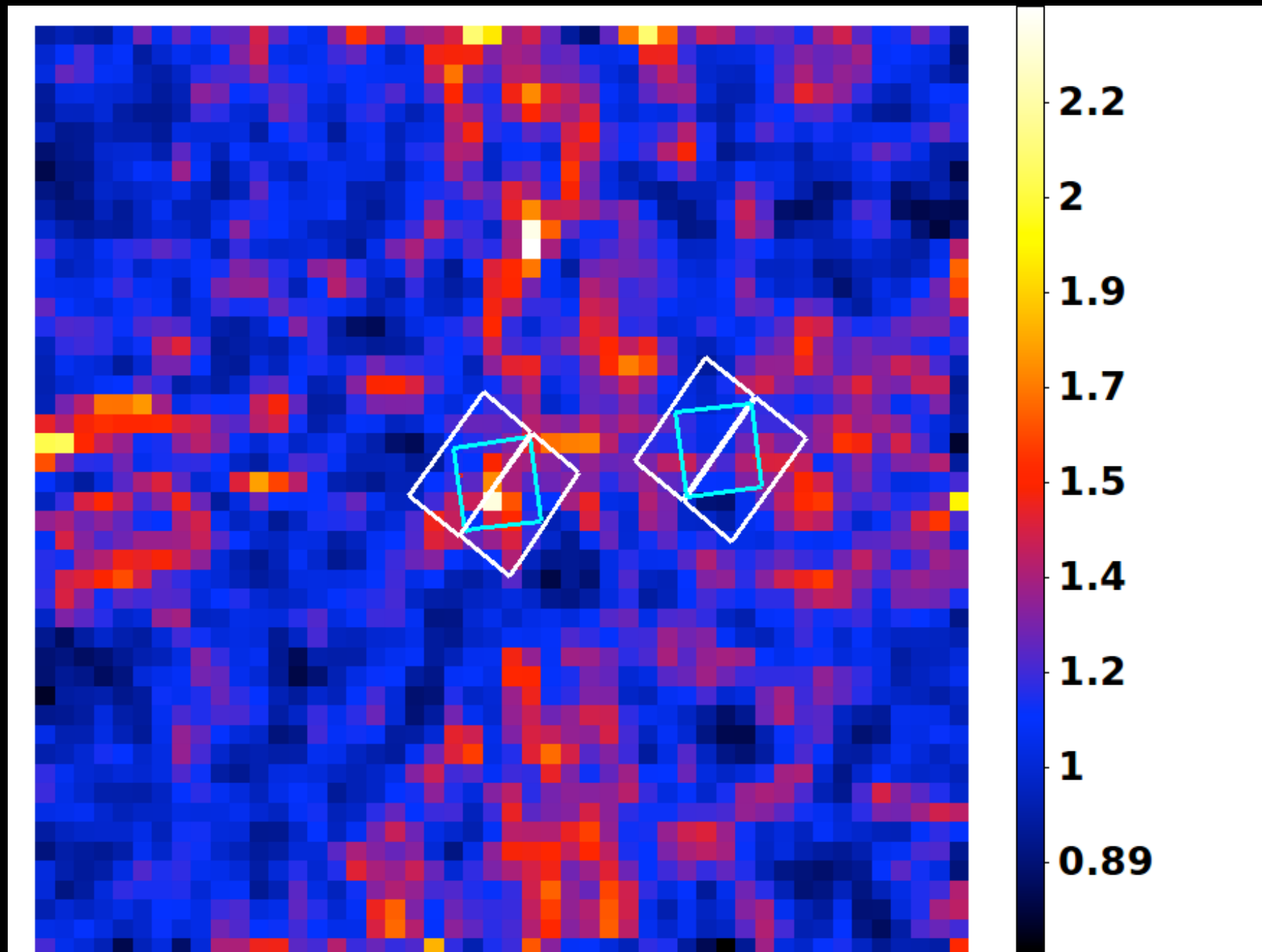


Magnification in the parallel field



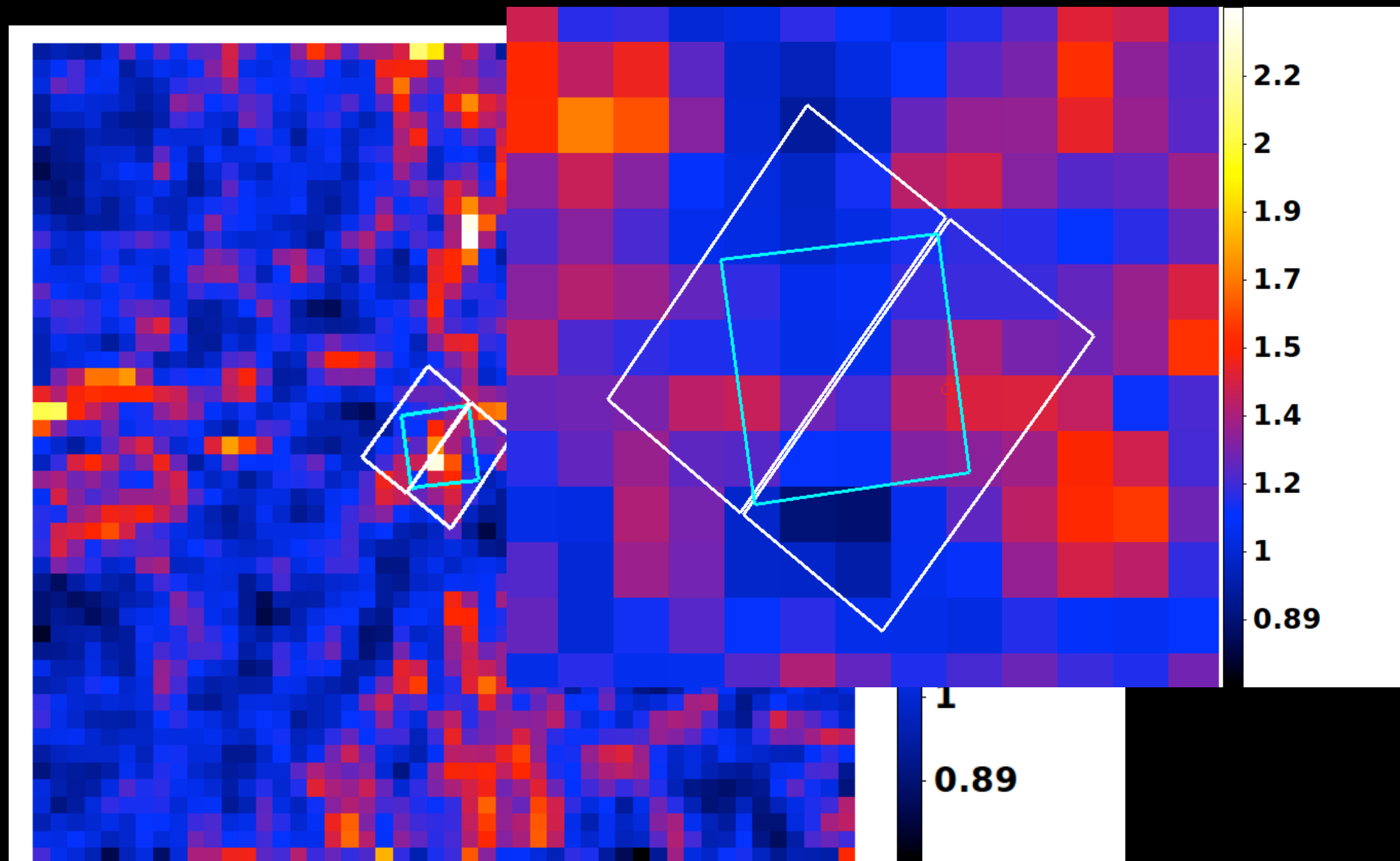
$z_s = 8.0$

Magnification in the parallel field



$z_s = 8.0$

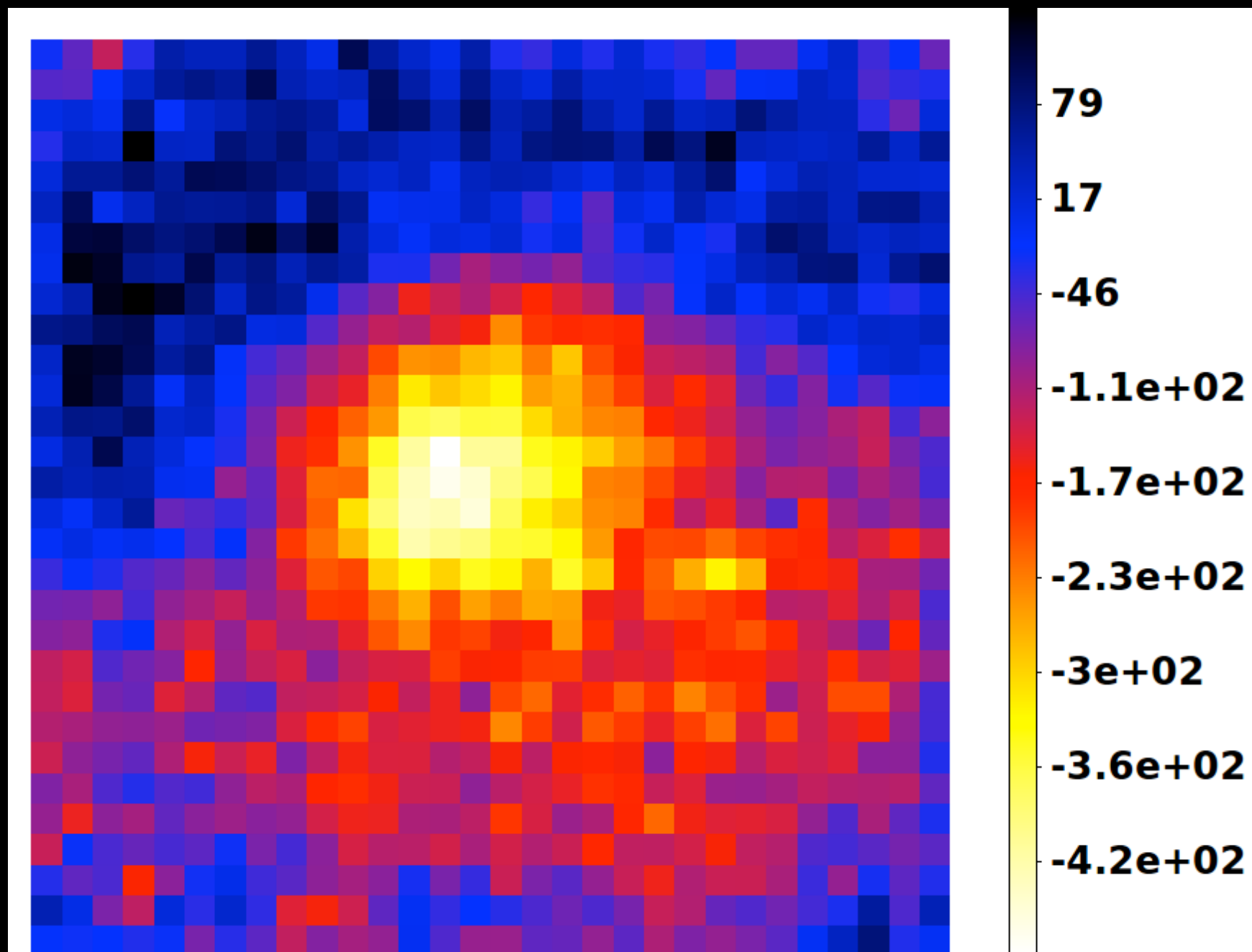
Magnification in the parallel field



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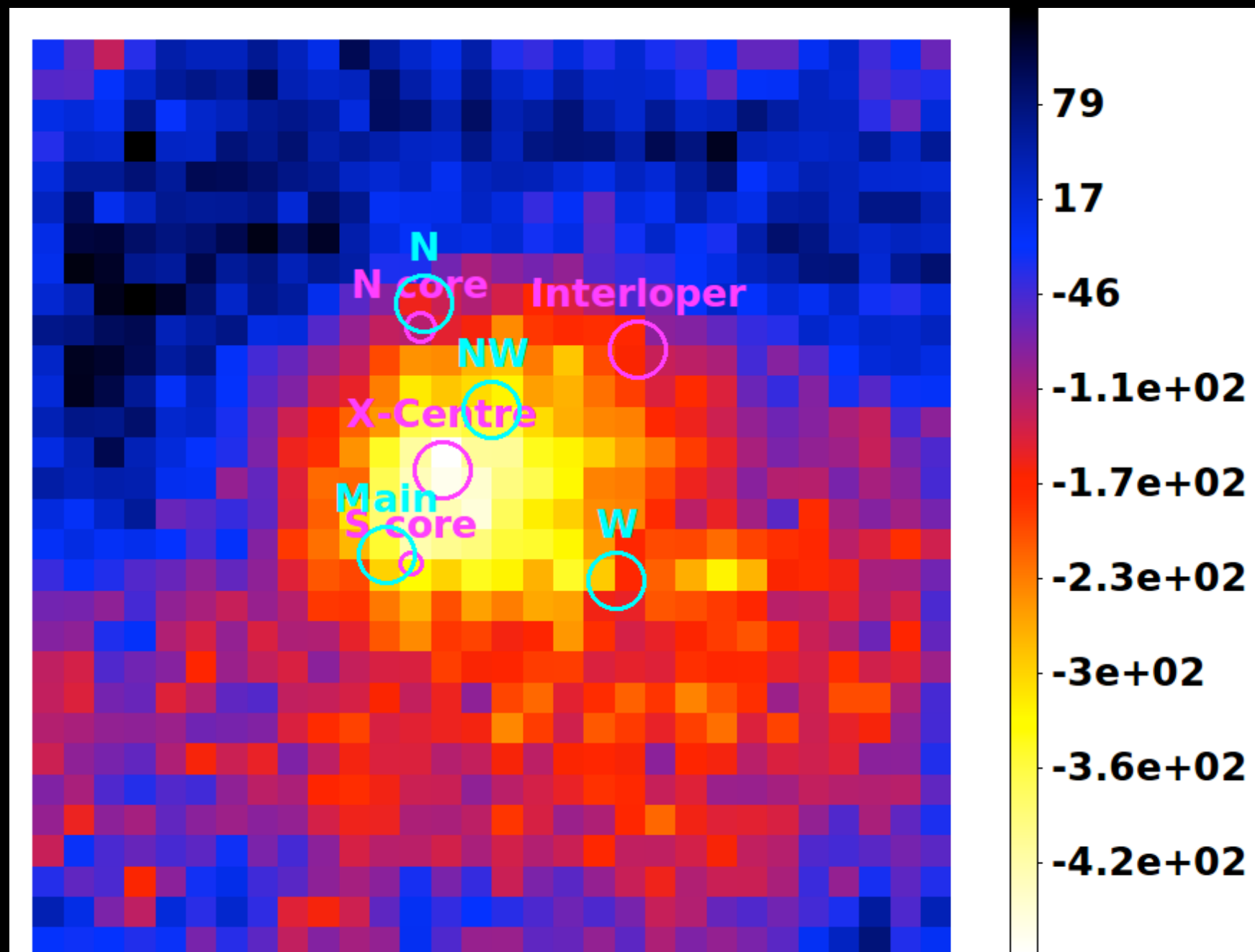
New Bolocam data

CSO/Bolocam 2mm data, 30hrs of integration, final S/N ~ 16 , good conditions



New Bolocam data

CS0/Bolocam 2mm data, 30hrs of integration, final S/N ~ 16 , good conditions



Getting HFF ready: SaWLens 2.0

STRIKE FIRST, STRIKE HARD

NO MERCY



[HTTP://WWW.COBRKAIDOJO.COM](http://www.cobra-kai-dojo.com)

quickmeme.com

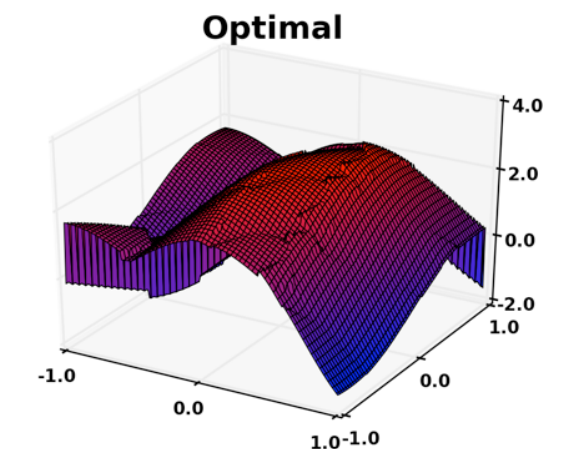
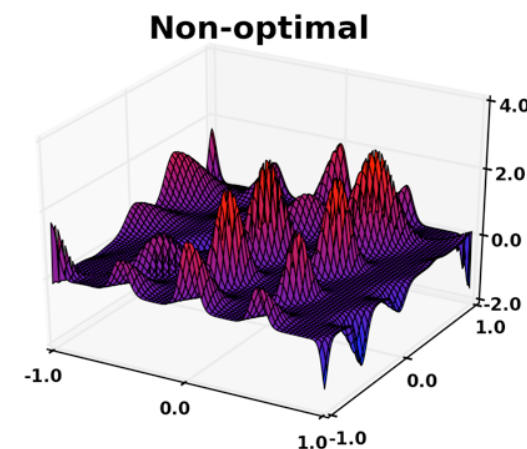
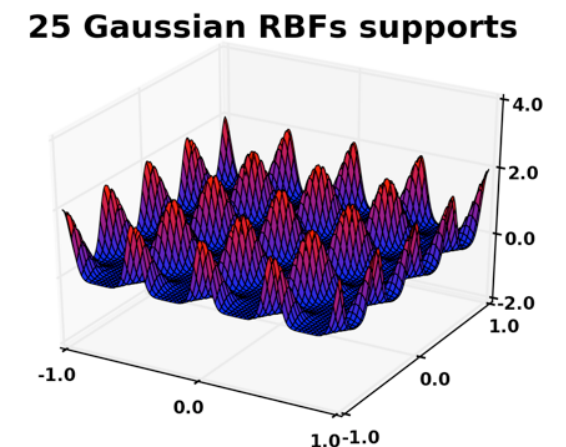
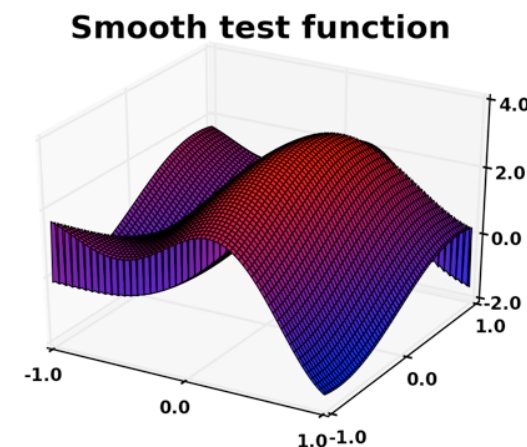
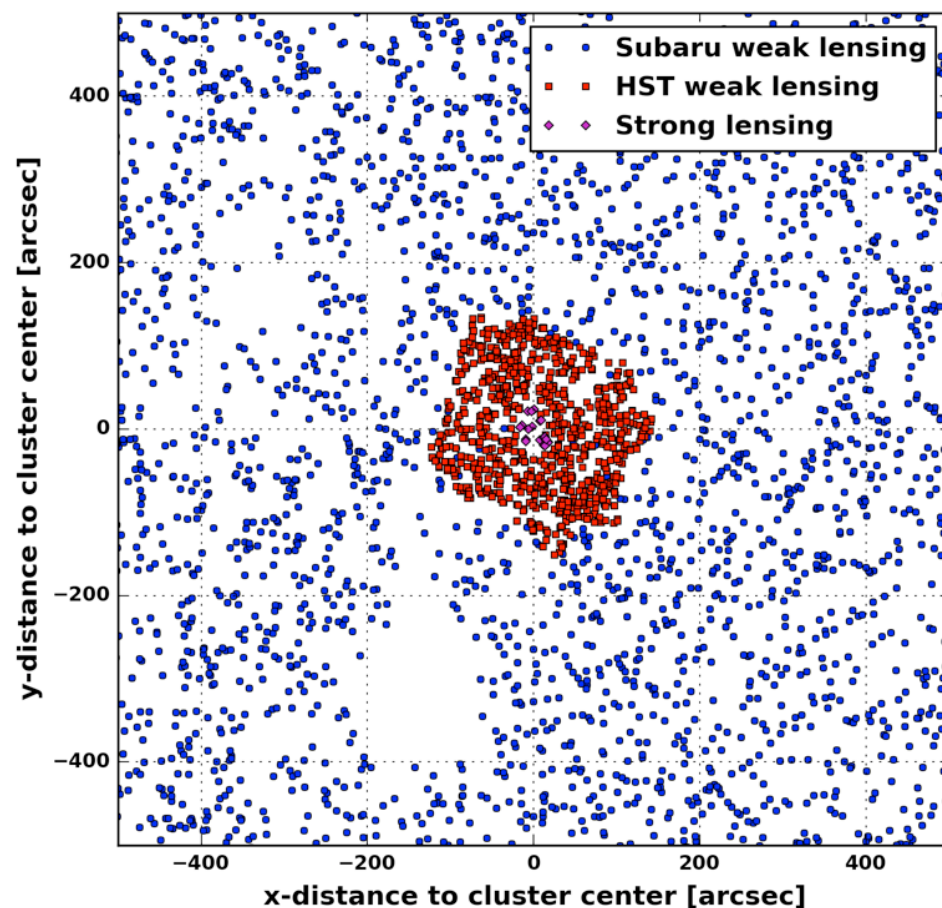
Getting HFF ready: SaWLens 2.0

Wide-field WL data with
10ks of galaxies

100s of multiple images
from different sources

HST WL data with 100s
galaxies/arcmin²

Ideally one wants to
combine all this into a
single reconstruction



JM 2014, in prep.

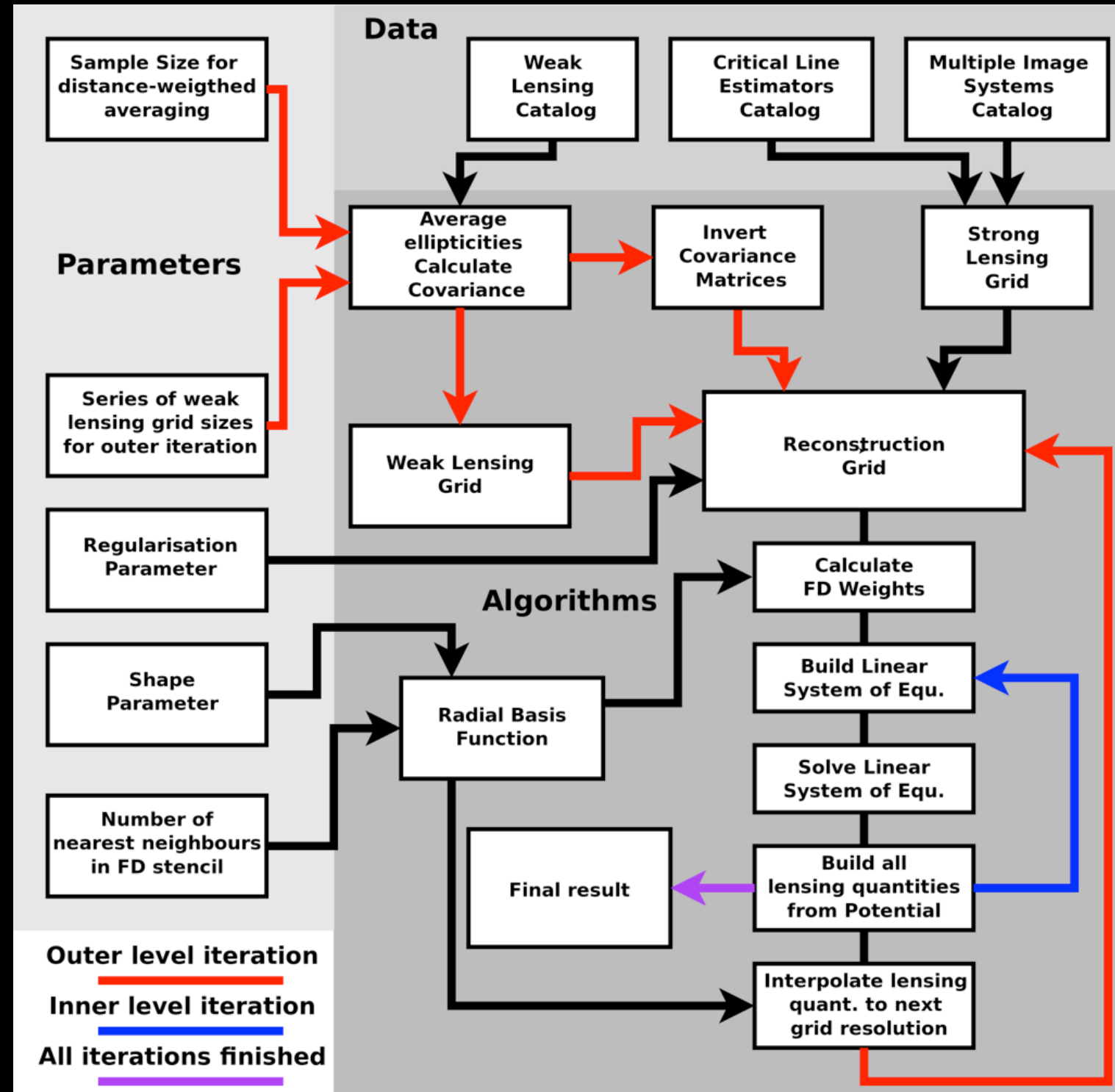
Implementation

Free-form approach

Uses:

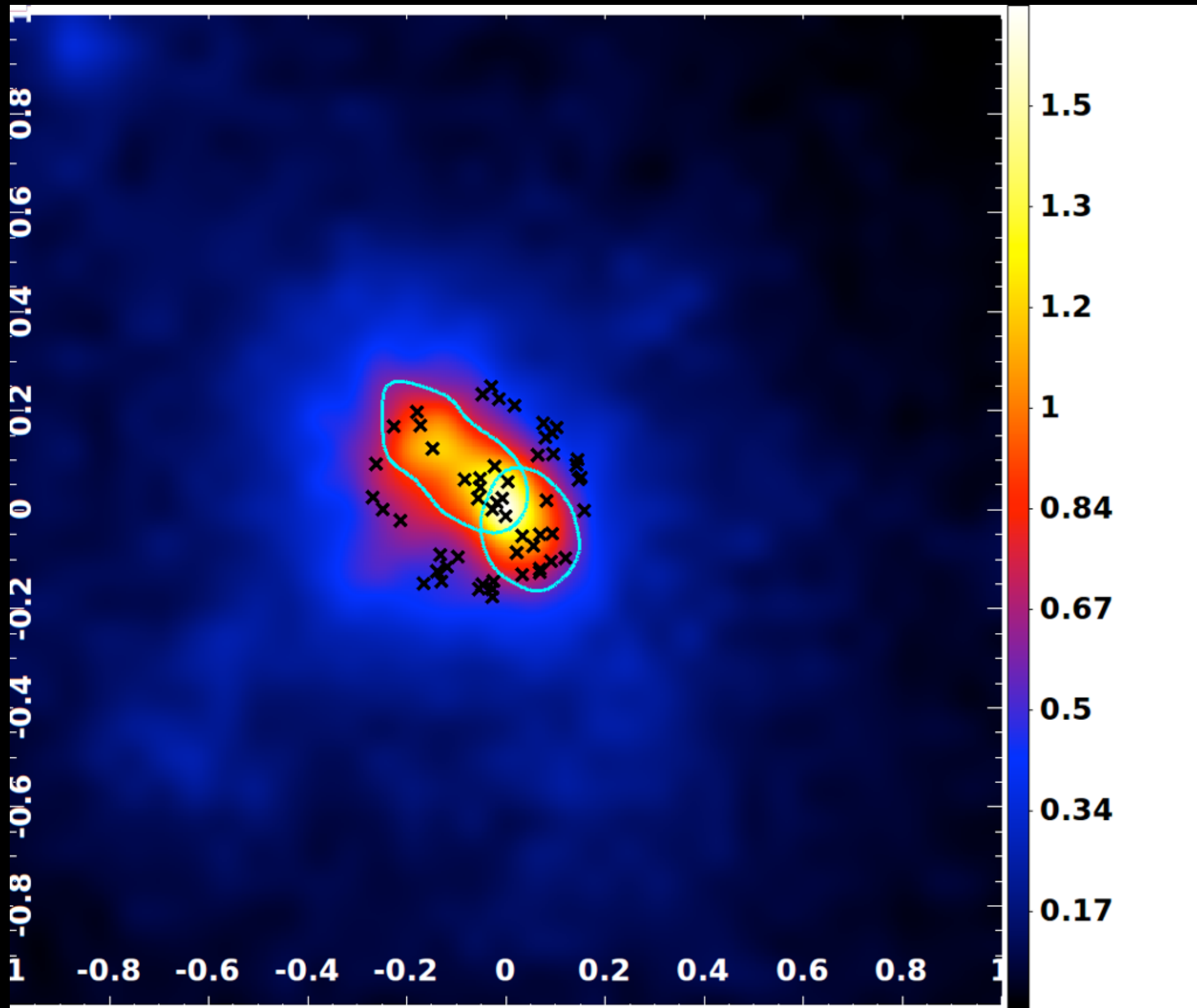
- reduced shear
- multiple image systems
- critical line estimators
- flexion

Implements general concept of Bradac 05 and Merten 09



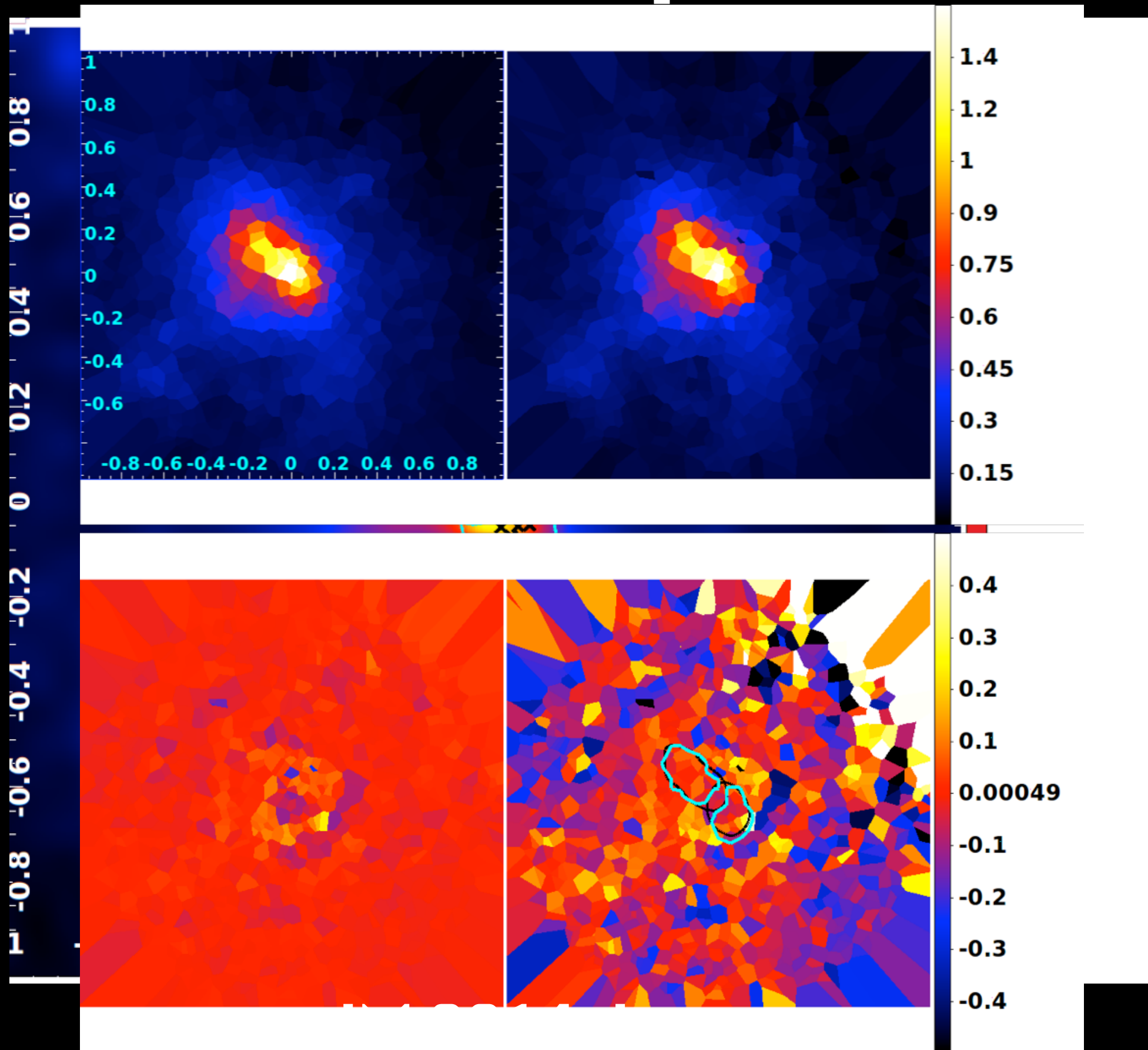
JM 2014, in prep.

Tests with a simple Mock lens



JM 2014, in prep.

Tests with a simple Mock lens

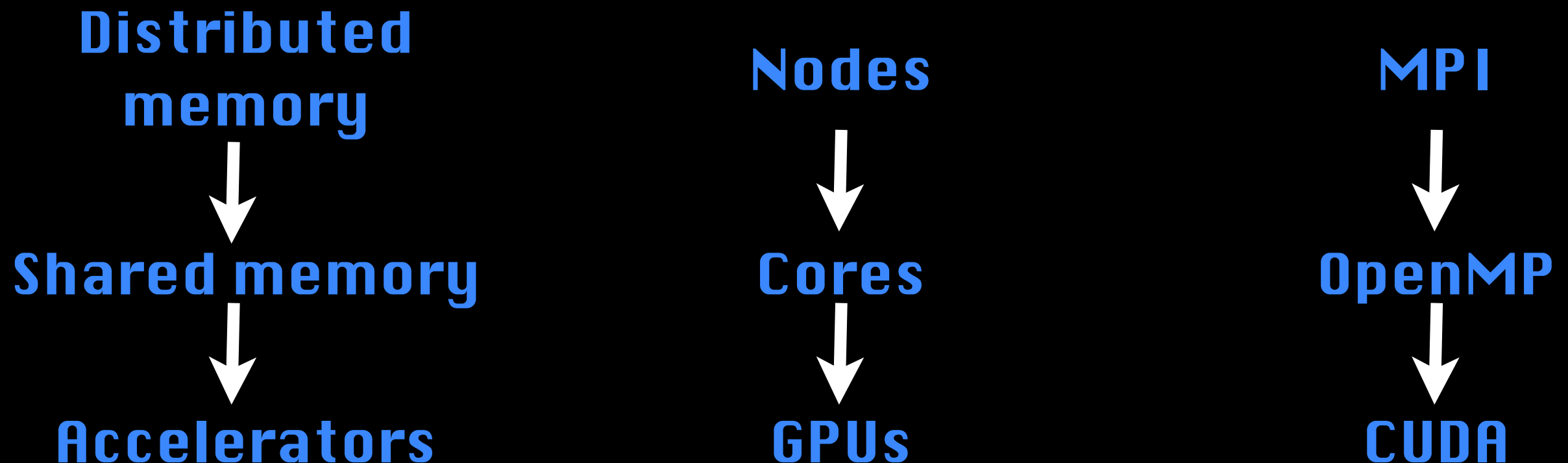


Some words on runtime

This method does not waste any pixels

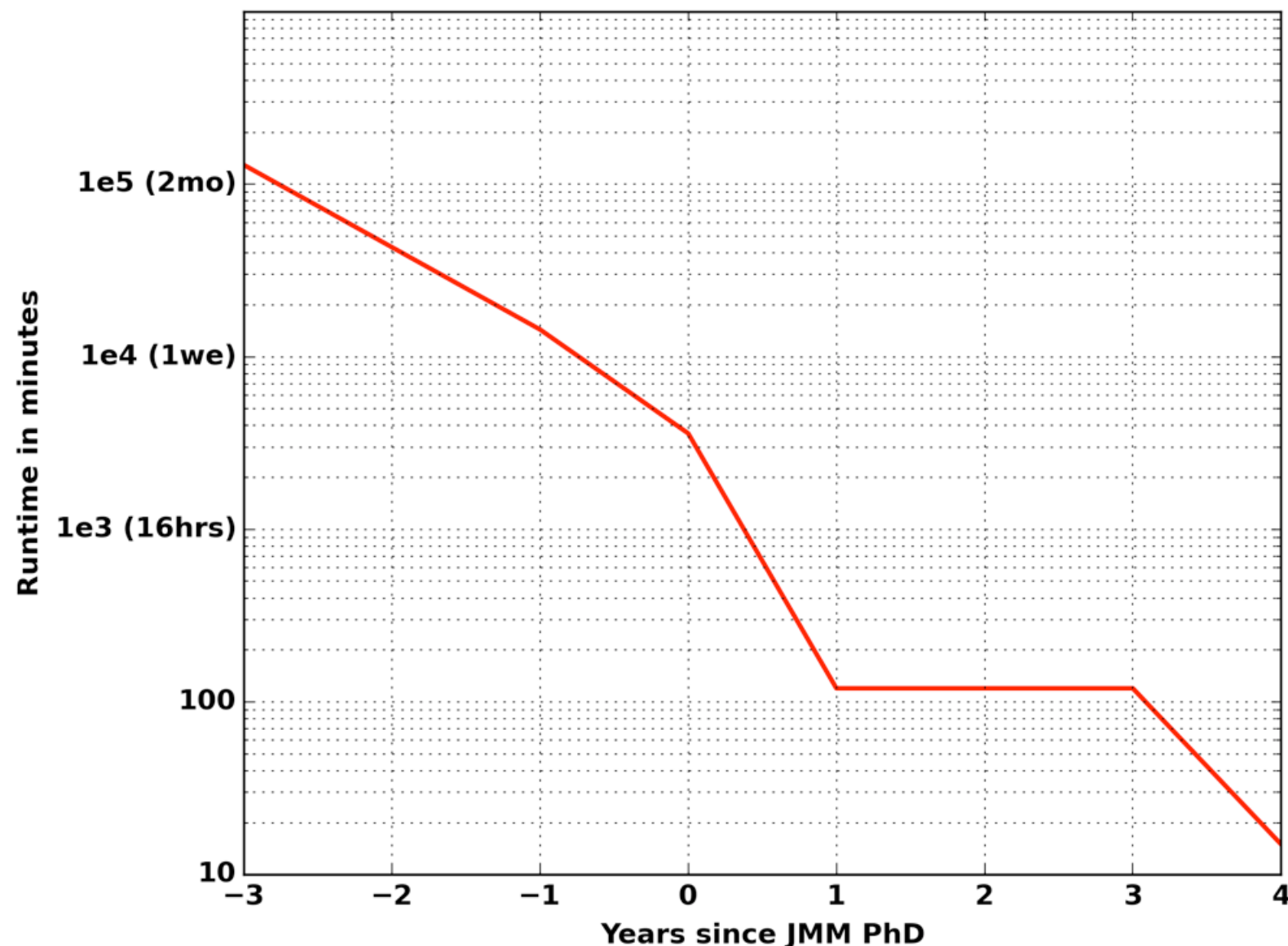
**In a free-form method this directly translates into
runtime efficiency**

However, three-stage parallelization:



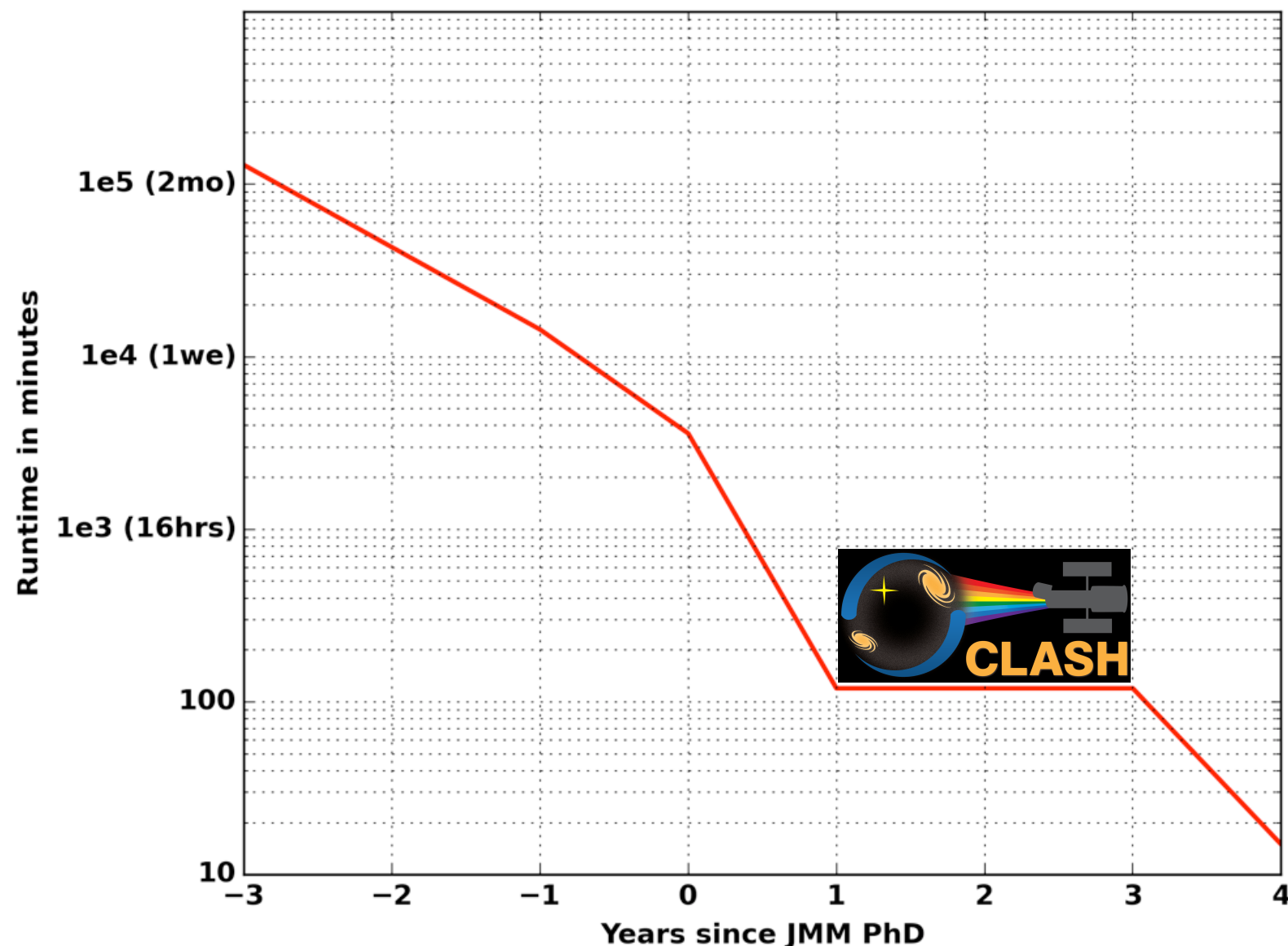
So how fast is it?

Single Core SaWLens speed evolution for a half-degree FoV with strong-lensing core



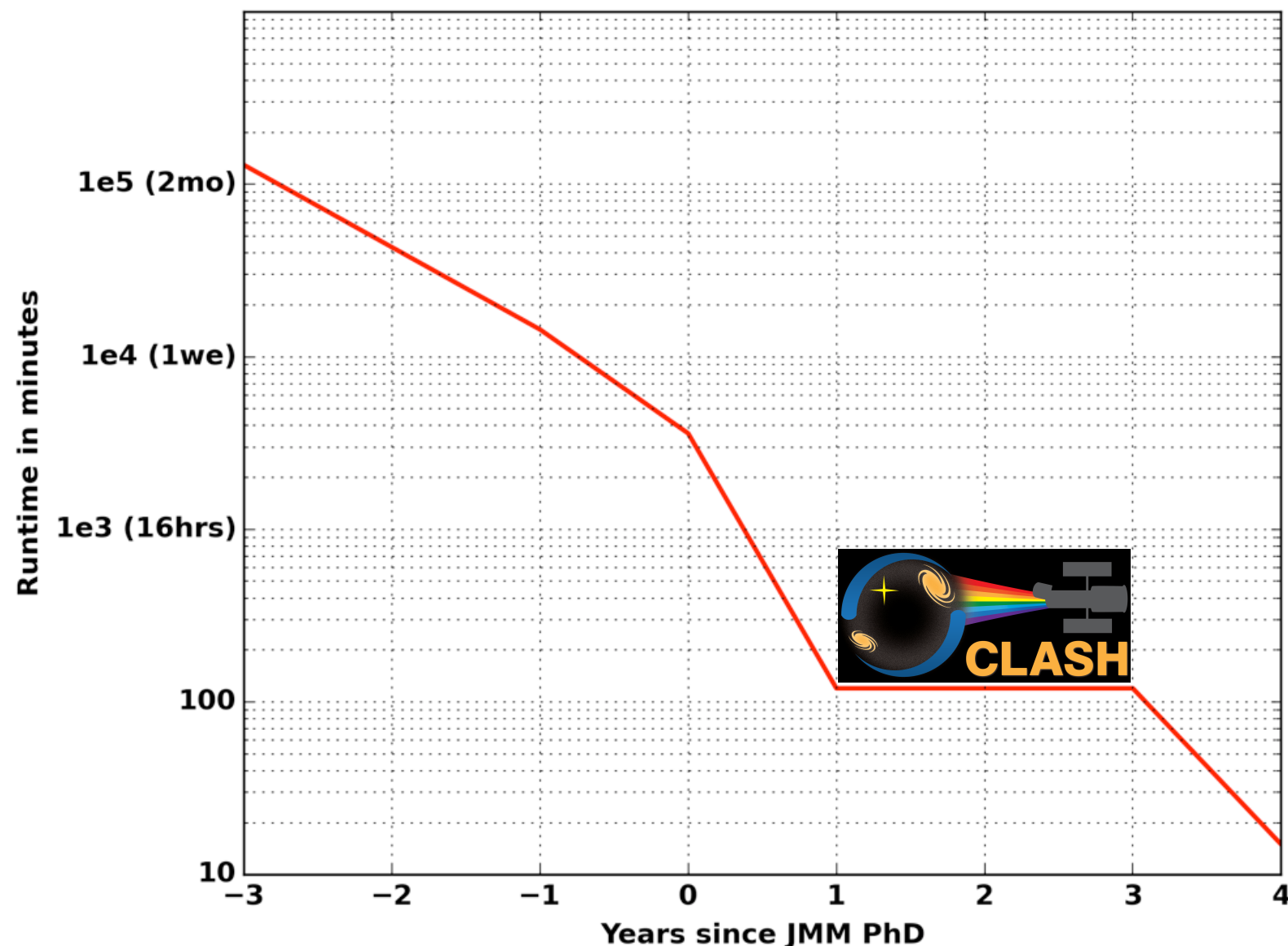
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So how fast is it?

Single Core SaWLens speed evolution for a half-degree FoV with strong-lensing core



Conclusions & Outlook

The HST FF Clusters are interesting mergers
throughout, we can learn a lot about dark matter
here

With new wide-field, multi-band, good-seeing
Subaru/Suprimecam and CS0/Bolocam mm data we
close a gap in the HST FF data coverage

Stop calling the PARALLEL fields BLANK!
&%\$!§§ ... Please

New methods can fully exploit this great data,
looking forward to work with CATS on A2744

We still have to test our new method with
Massimo's simulations, the only way to assess the
systematics

Basic tests

