

# Nonparametric mass reconstructions for CLASH

CLASH fall meeting

Heidelberg, Oct. 18 2011

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# **Announcements**

**No “official” social dinner tonight**

**People staying at the conference centre:**

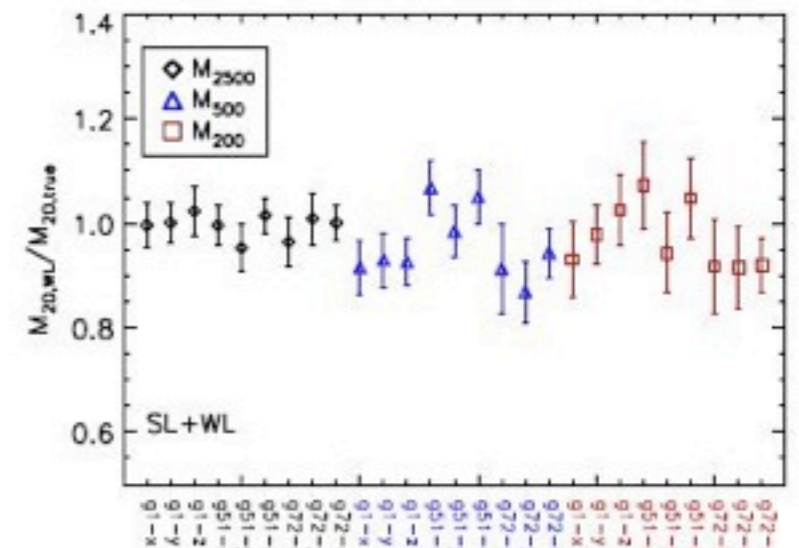
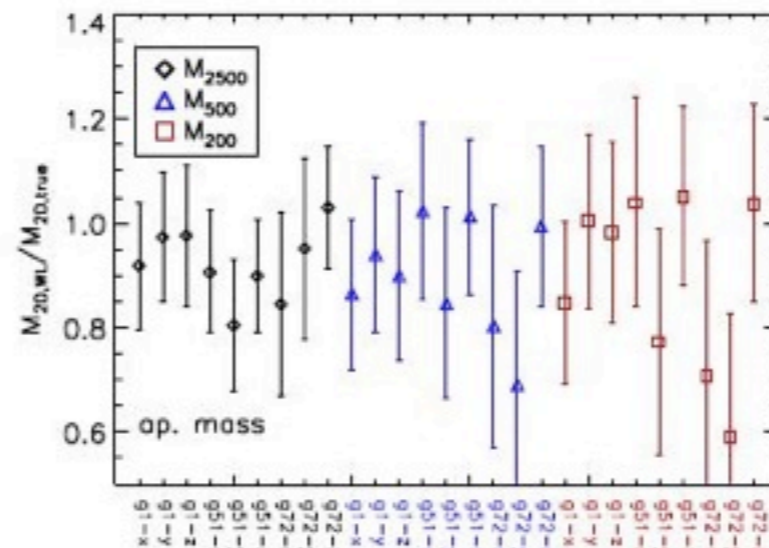
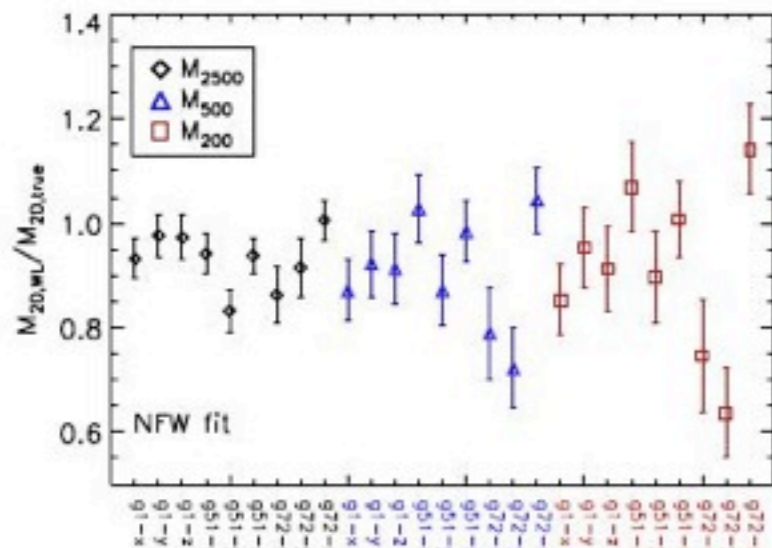
**Please give me the money by Wednesday  
(65EUR /night)**

**People who took a TLS shuttle:**

**(32 EUR)**

# Nonparametric mass reconstruction

adaptive grid  
nonparametric  
multi-component  $\chi^2$   
large range of scales  
runtime expensive  
(massively parallel GPU  
implementation)



# Possible constraints

All used in a single fitting process

– Ellipticities of background galaxies

– Multiple image systems

– Proxies on the position of the critical line

– Flexion

– Magnification

– Dynamical constraints on  
different scales

– Different gas  
tracers

**Three  
Reconstructed CLASH clusters**

**Each of them with  
interesting features**

**Just came out of the machine**

# Abell 383: Data and field

## Input

### WL ellip catalogue

- Subaru
- CC-selected (5band)
- ver May 31 2011
- 10000 background galaxies

### SL feature catalogue

- Mult. images by Adi
- ver of submitted paper
- 9 image systems used

## Reconstruction

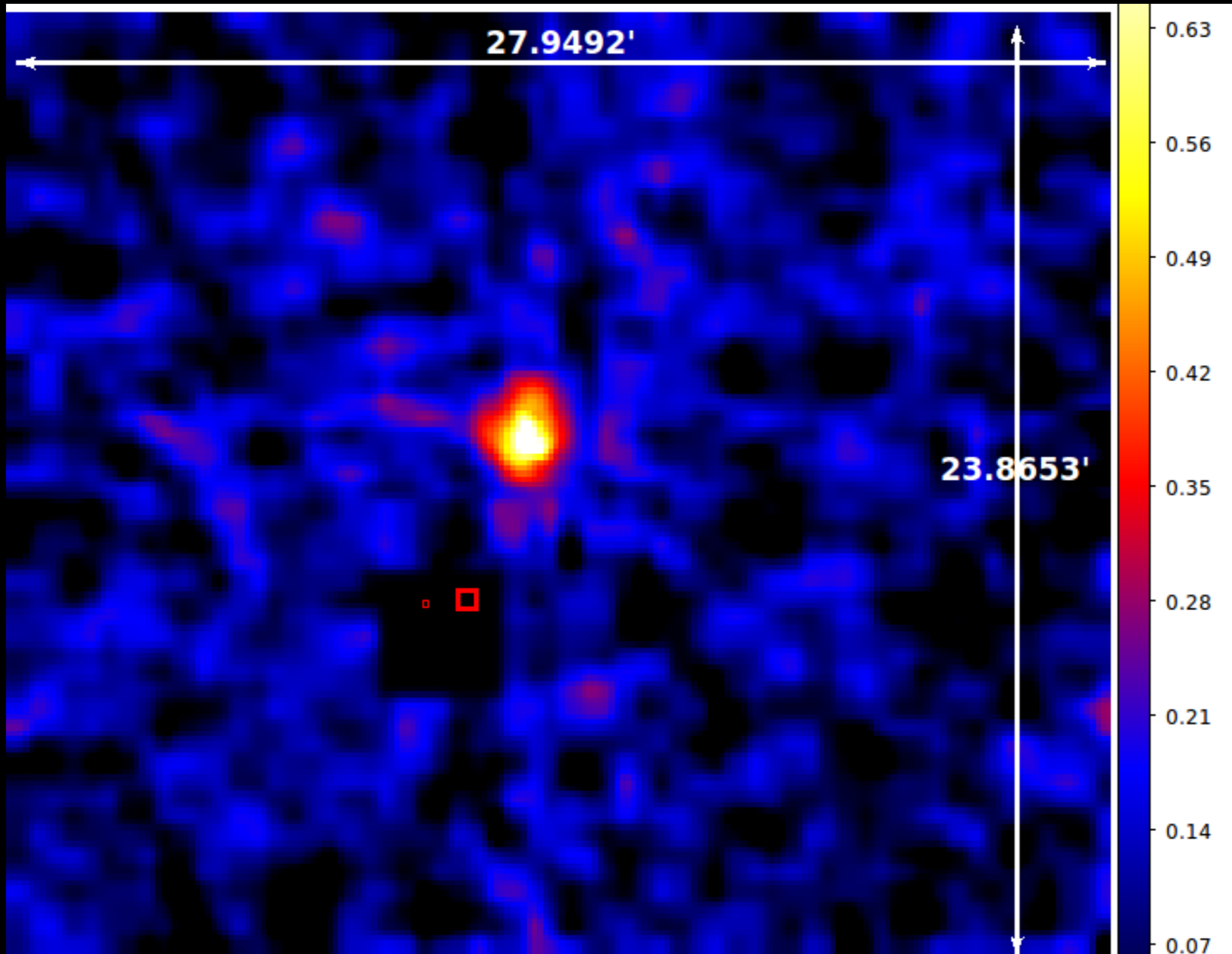
### Physical field size

- 1700'' x 1500''
- (5.3 x 4.7) Mpc

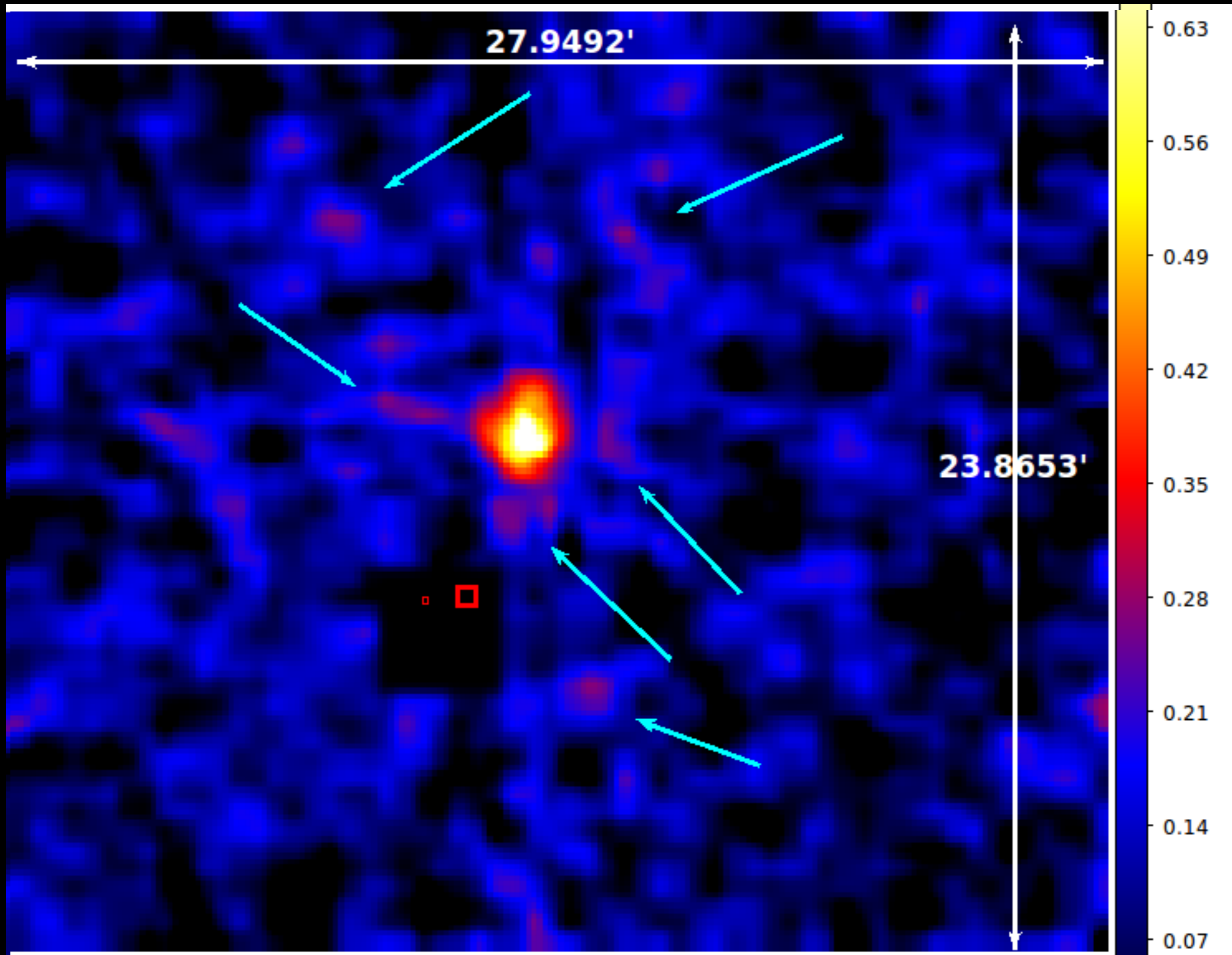
### Reconstruction details

- 60 x 52 pixel (WL)
- 200 x 171 pixel (SL)
- grid resolution: 8.5''
- 251 WL bootstraps
- 787 SL bootstraps

# Abell 383: Reconstruction

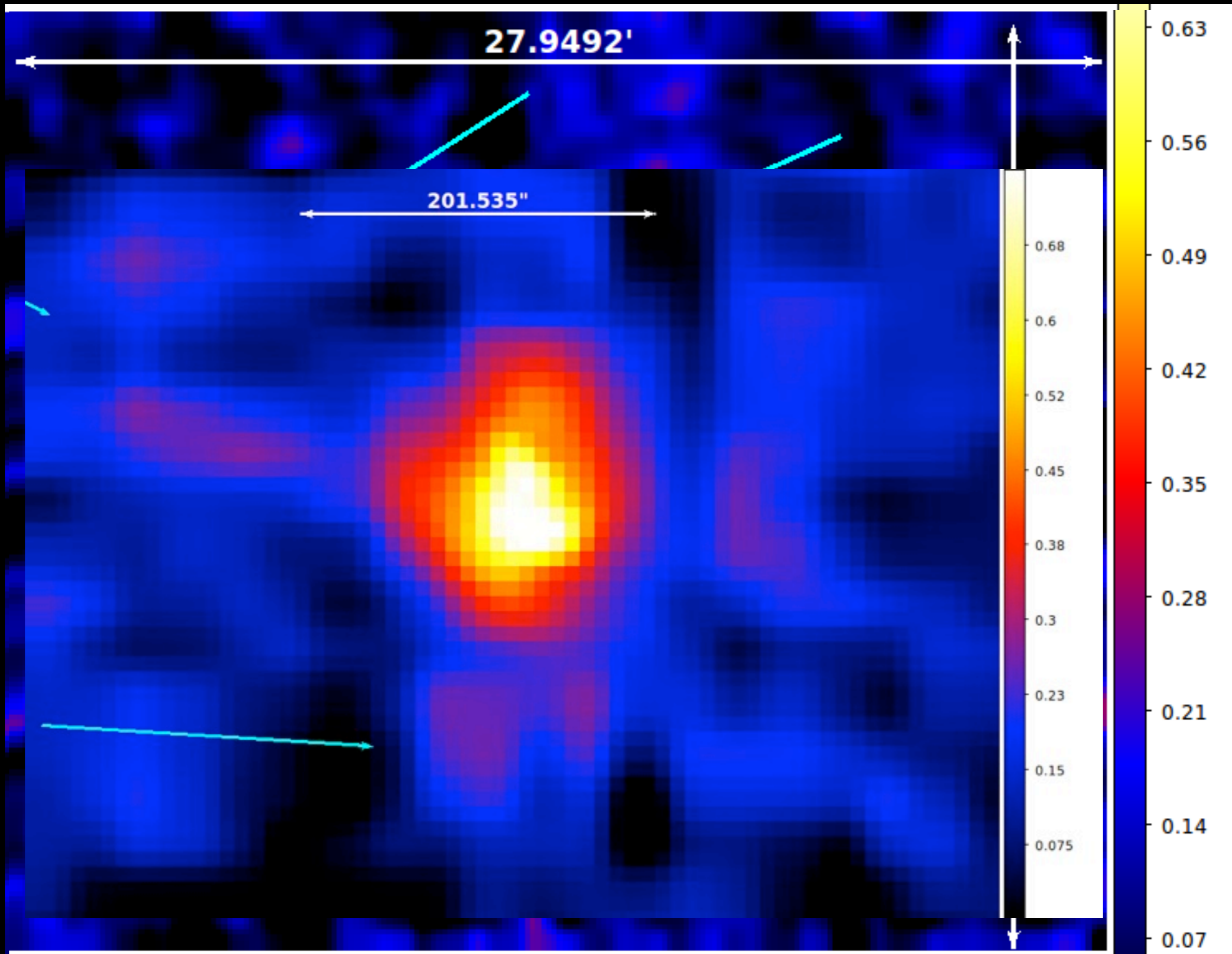


# Abell 383: Reconstruction

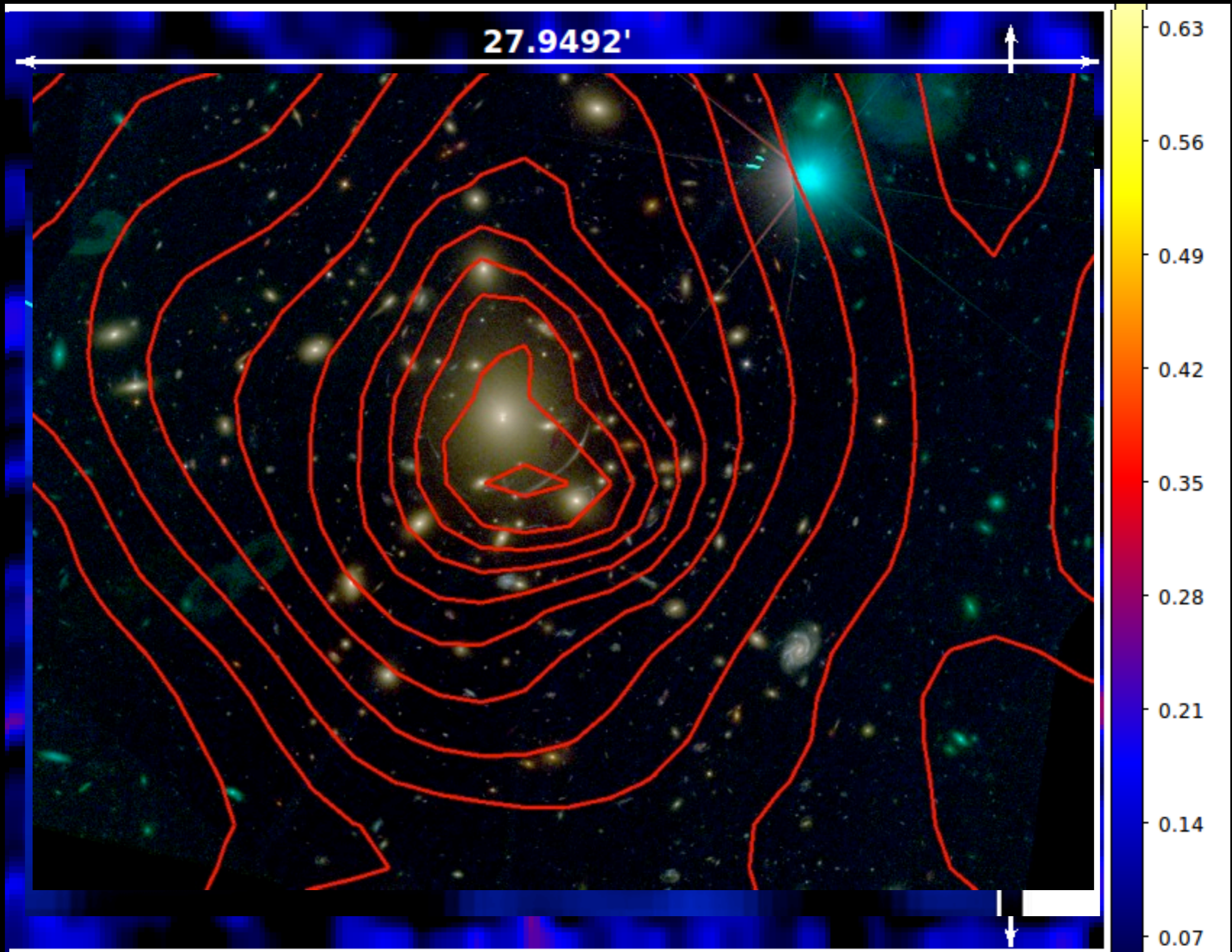




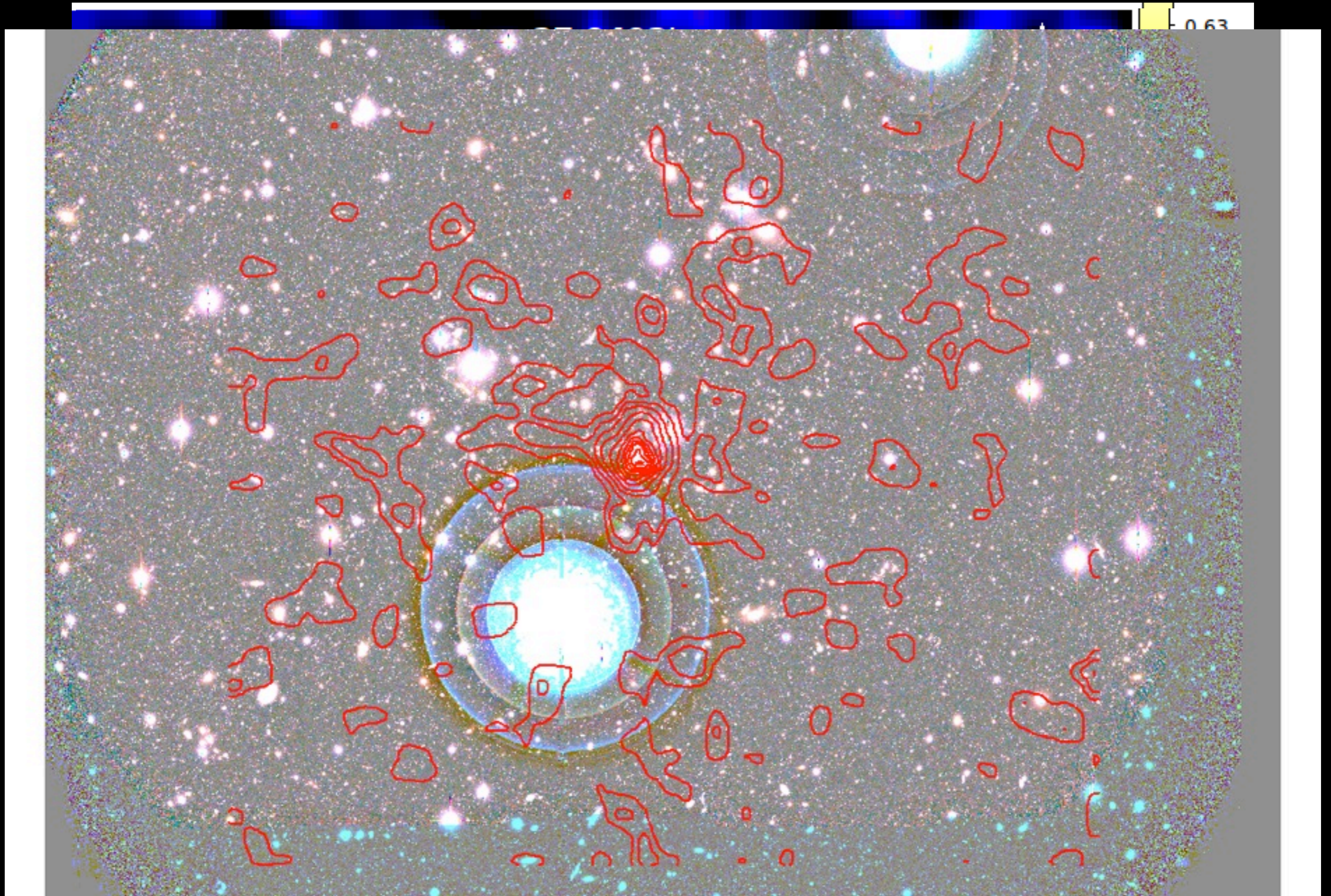
# Abell 383: Reconstruction



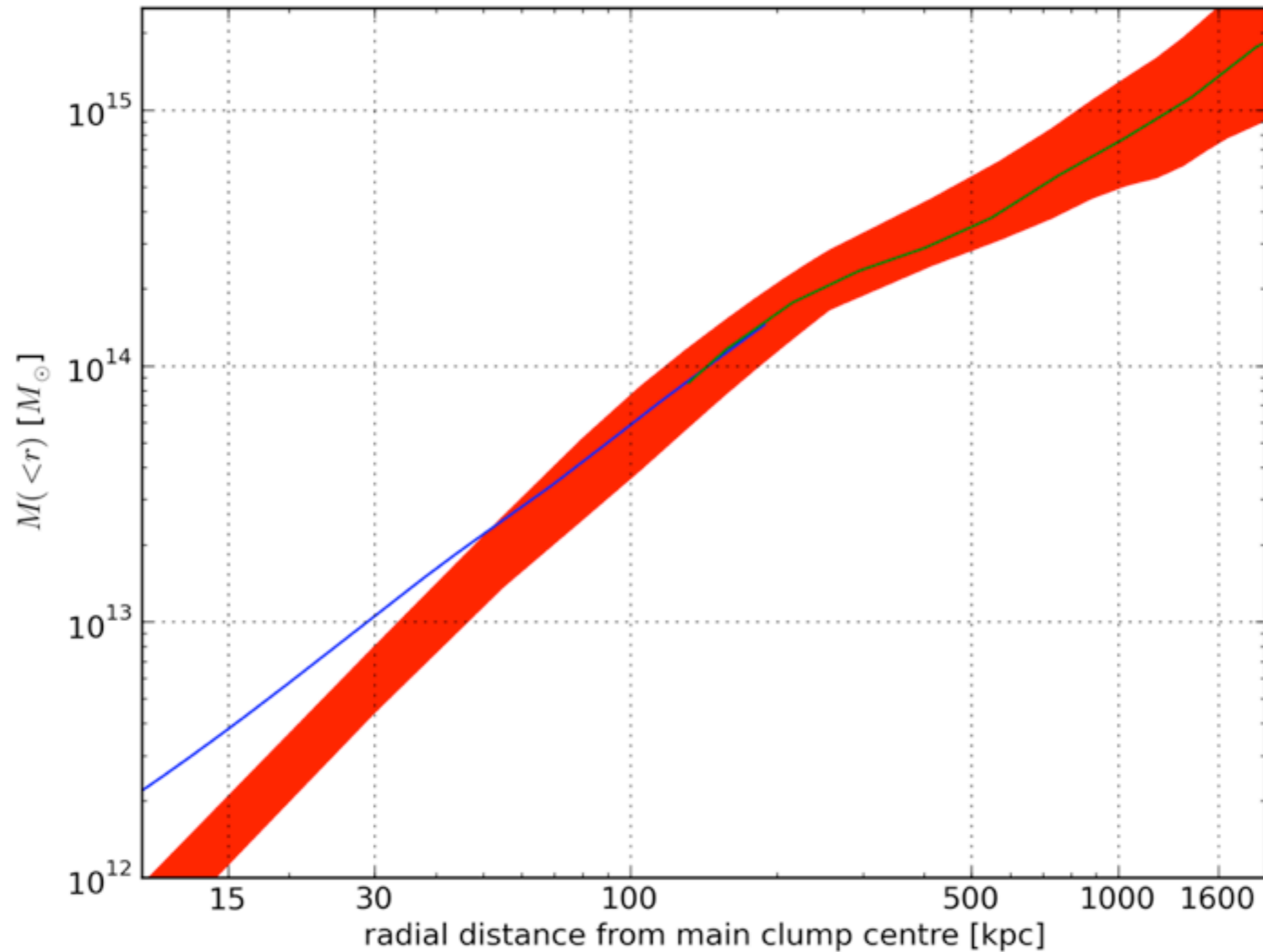
# Abell 383: Reconstruction



# Abell 383: Reconstruction



# Abell 383: Profiles and Comparison



# MACS 1206: Data and field

## Input

### WL ellip catalogue

- Subaru
- CC-selected (5band)
- ver Jul 26 2011
- 13000 background galaxies

### SL feature catalogue

- Mult. images by Adi
- ver of submitted paper
- 13 image systems used

## Reconstruction

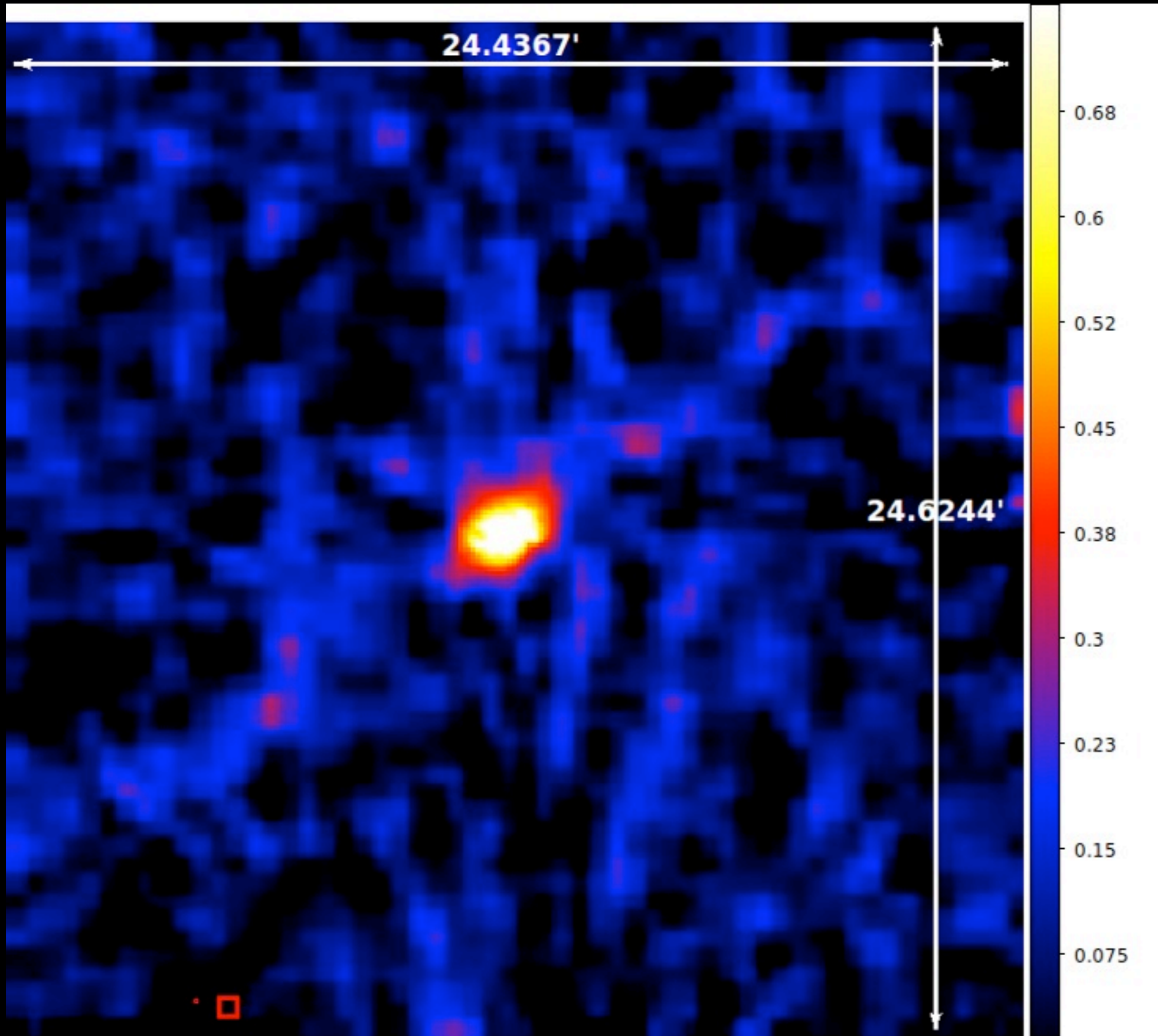
### Physical field size

- 1500'' x 1500''
- (8.5 x 8.5) Mpc

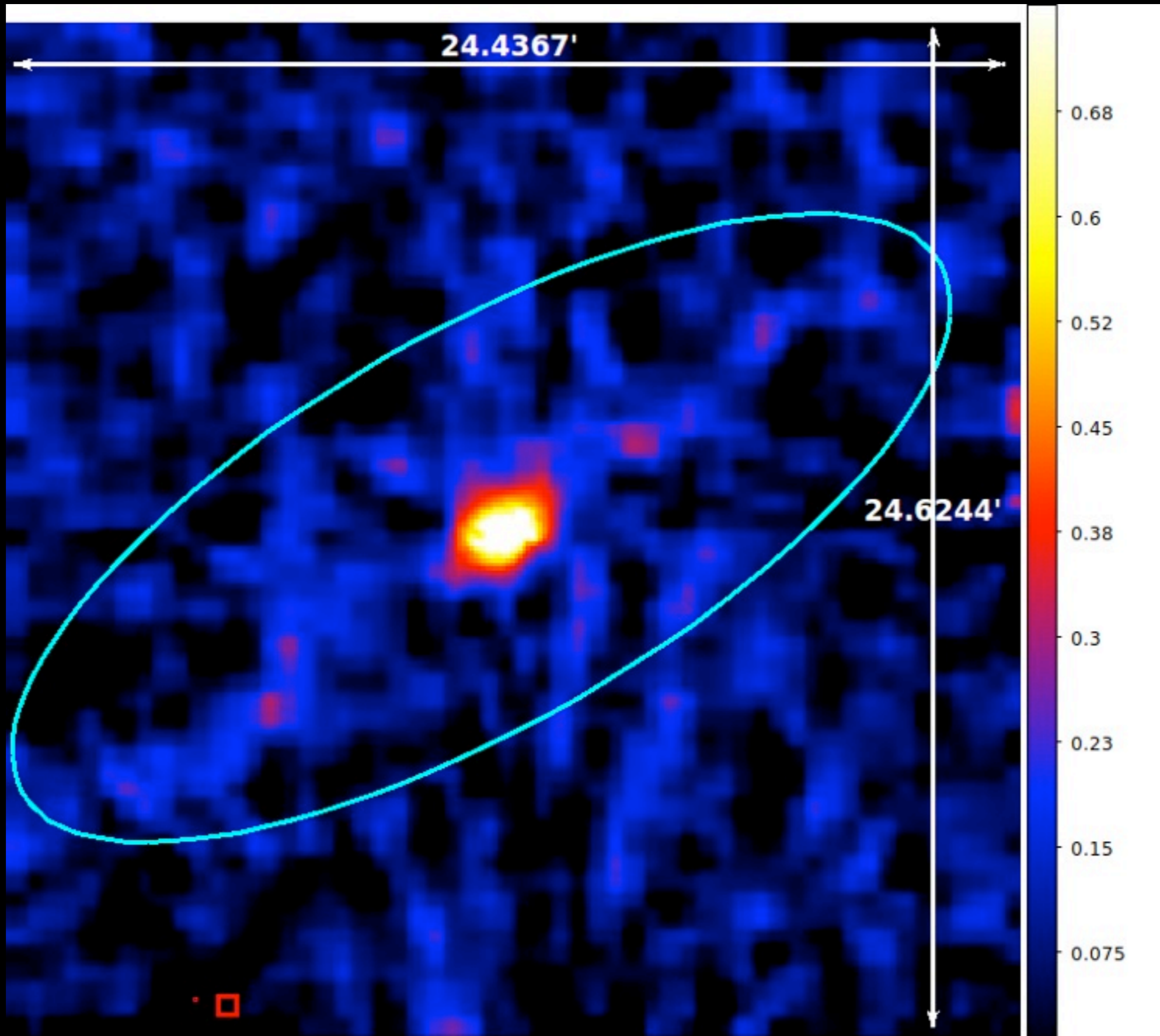
### Reconstruction details

- 60 x 60 pixel (WL)
- 250 x 250 pixel (SL)
- grid resolution: 6.0''
- 251 WL bootstraps
- 348 SL bootstraps

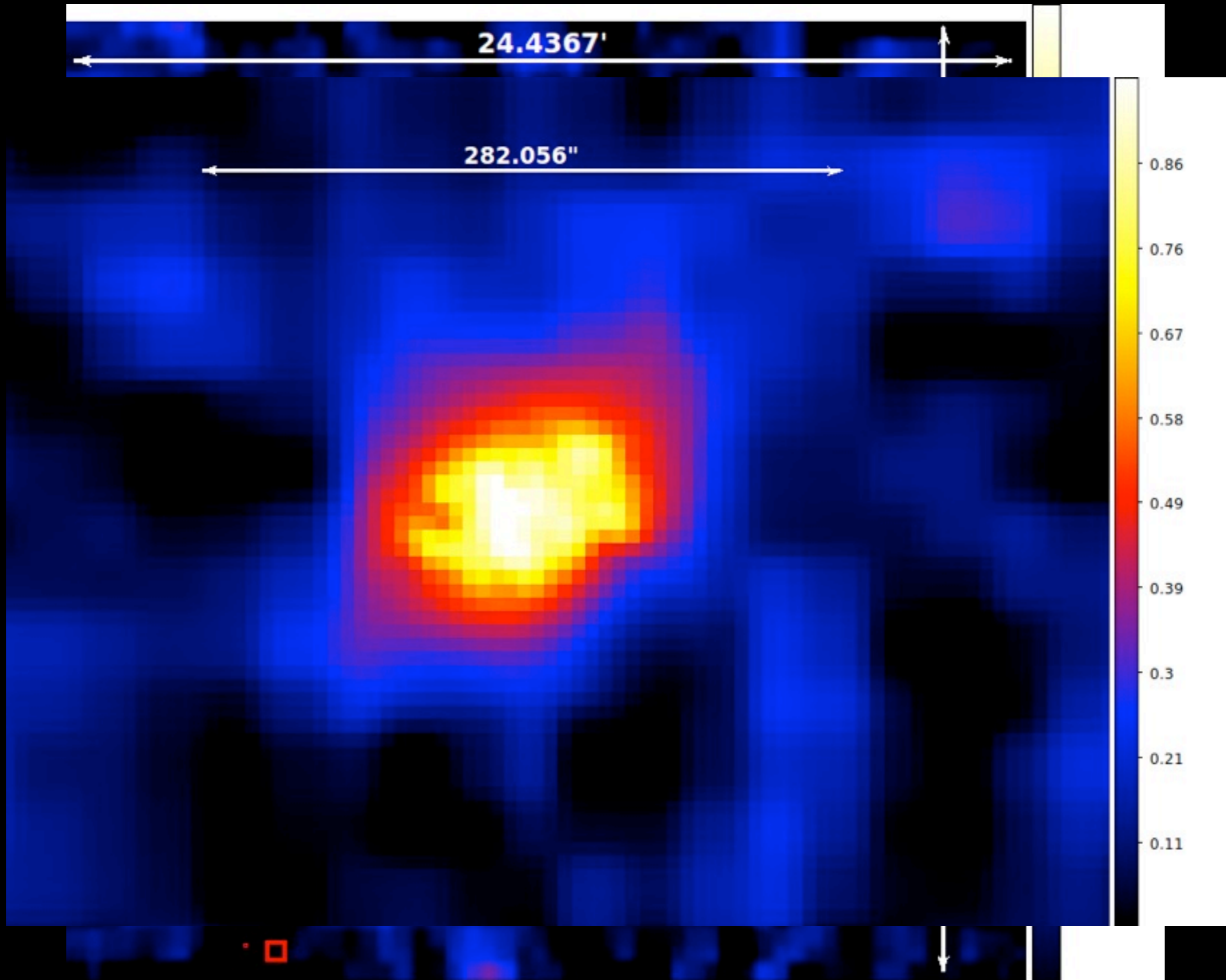
# MACS 1206: Reconstruction



# MACS 1206: Reconstruction

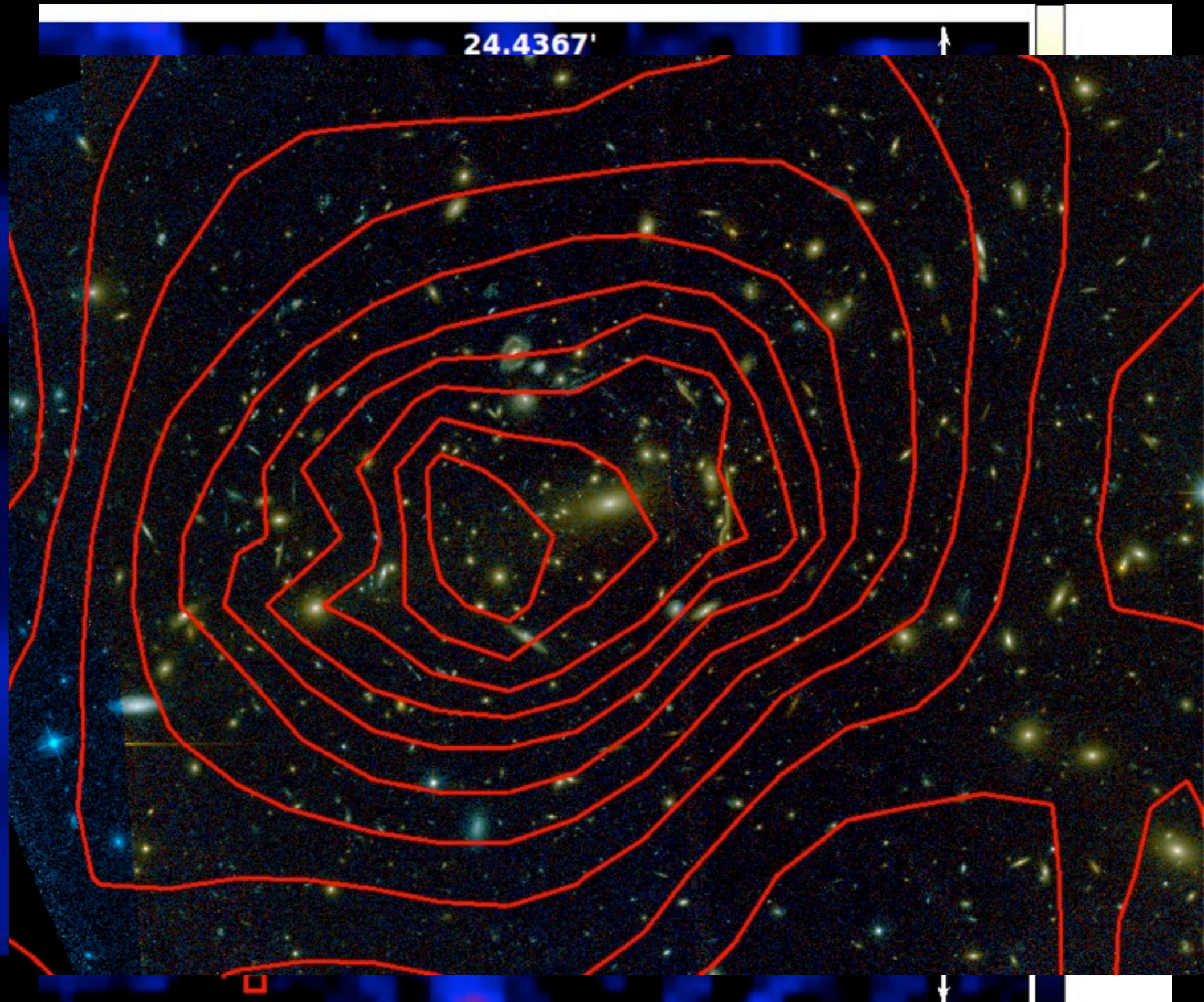


# MACS 1206: Reconstruction

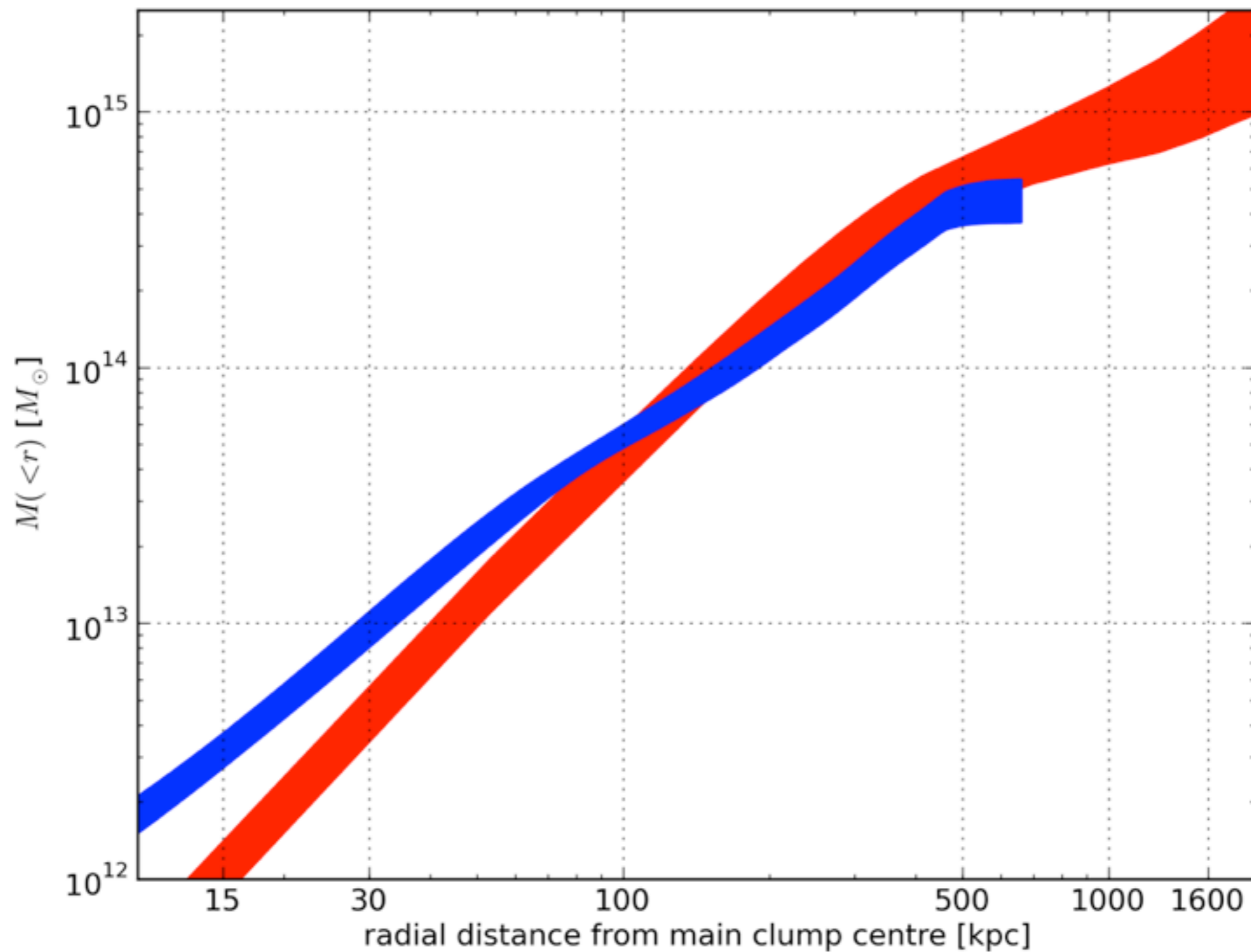




# MACS 1206: Reconstruction



# MACS 1206: Profiles



# Abell 2261: Data and field

## Input

### WL ellip catalogue

- Subaru
- CC-selected (3band)
- ver Jul 5 2011
- 16000 background galaxies

### SL feature catalogue

- Mult. images by Adi
- ver of submitted paper
- 12 image systems used

## Reconstruction

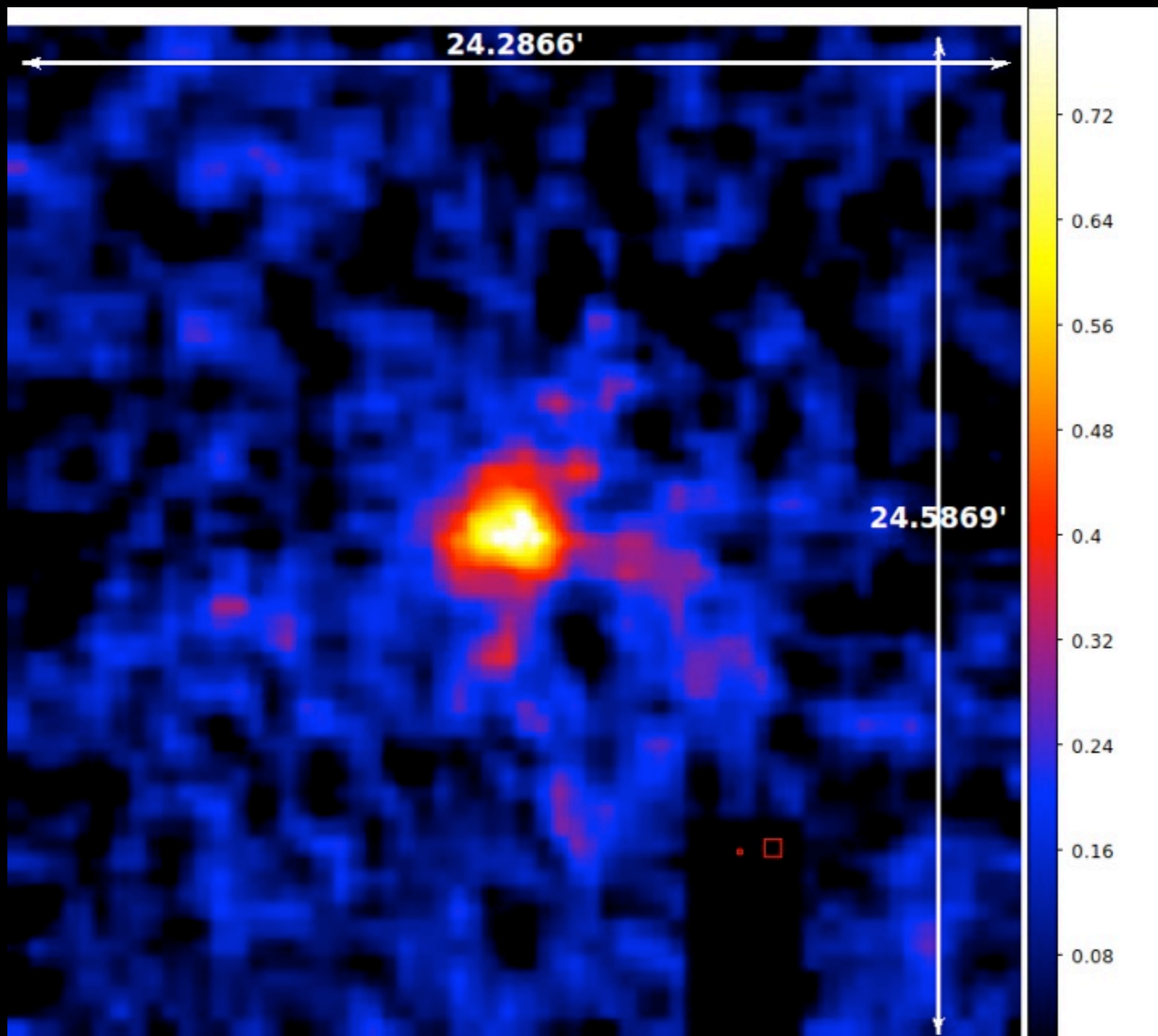
### Physical field size

- 1500'' x 1500''
- (5.3 x 5.3) Mpc

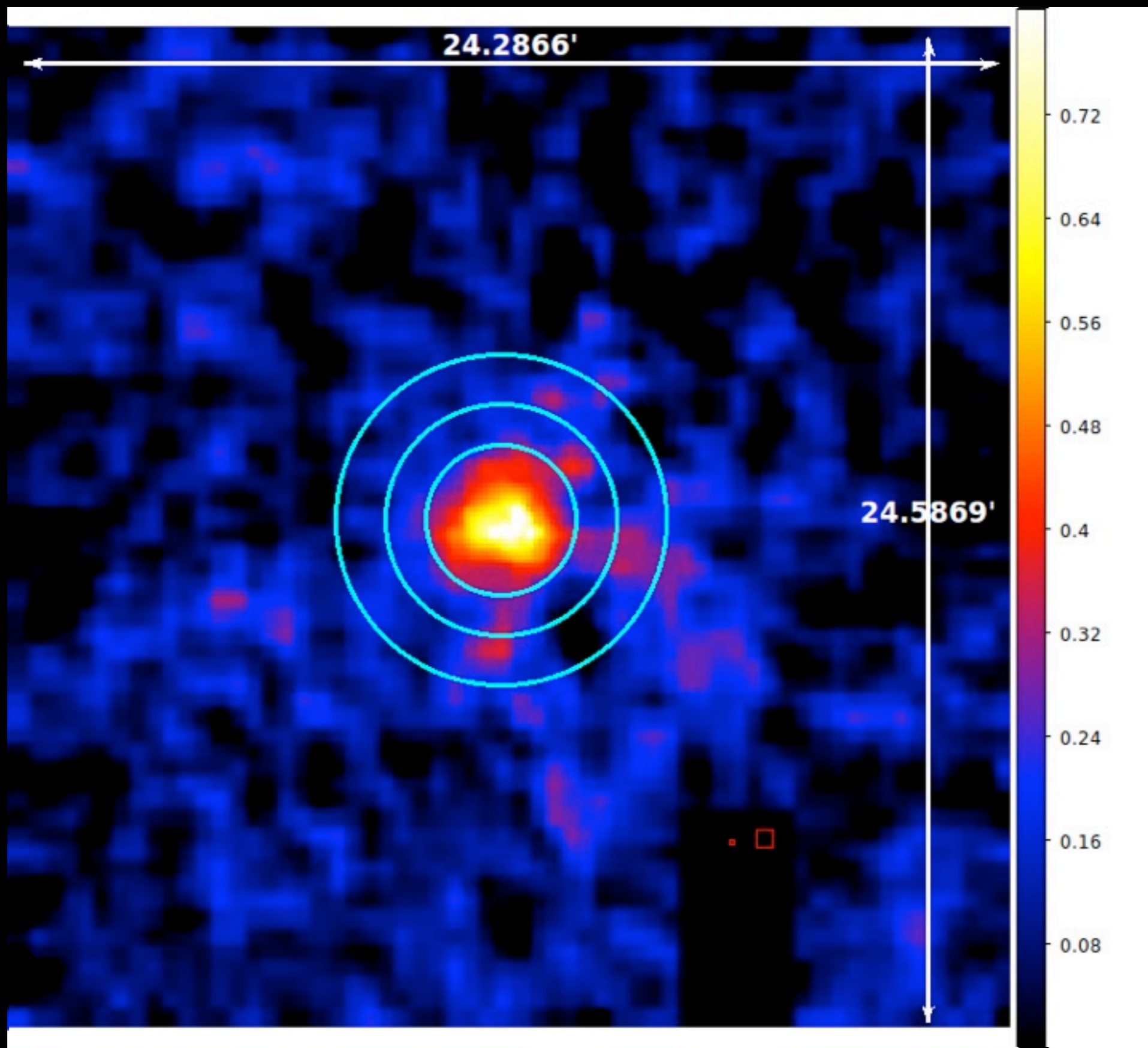
### Reconstruction details

- 60 x 60 pixel (WL)
- 250 x 250 pixel (SL)
- grid resolution: 6.0''
- 251 WL bootstraps
- 348 SL bootstraps

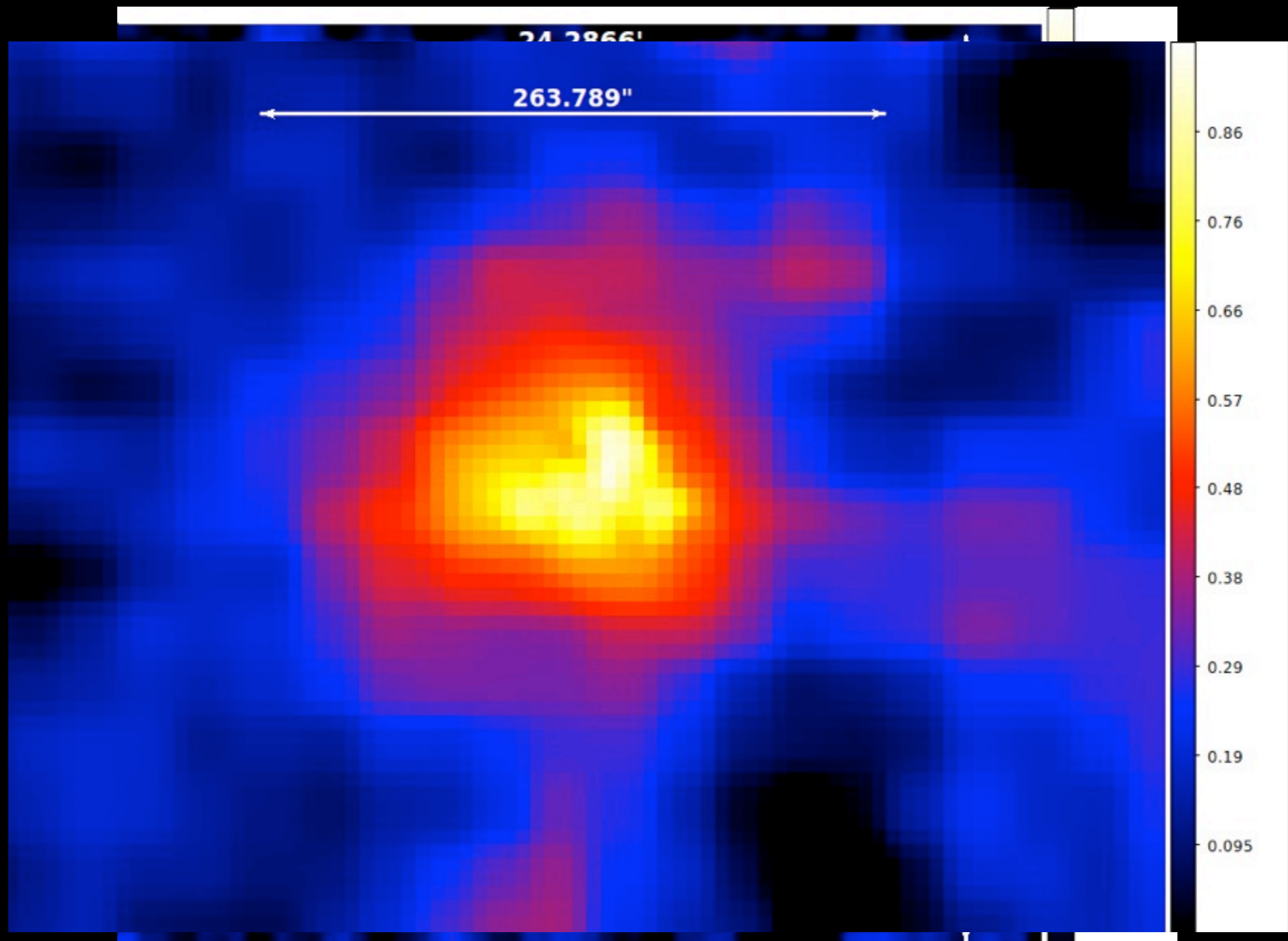
# Abell 2261: Reconstruction



# Abell 2261: Reconstruction

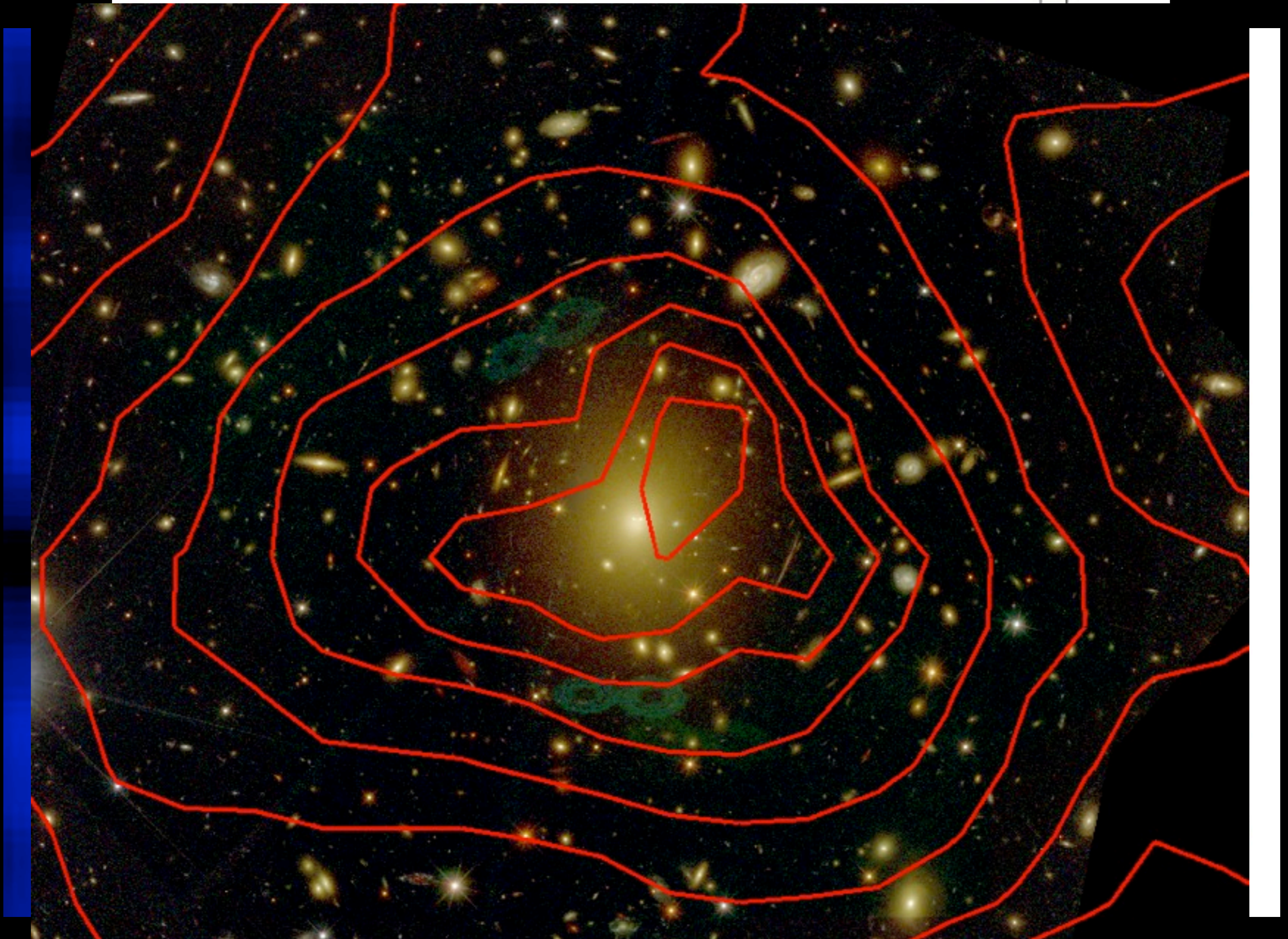


# Abell 2261: Reconstruction

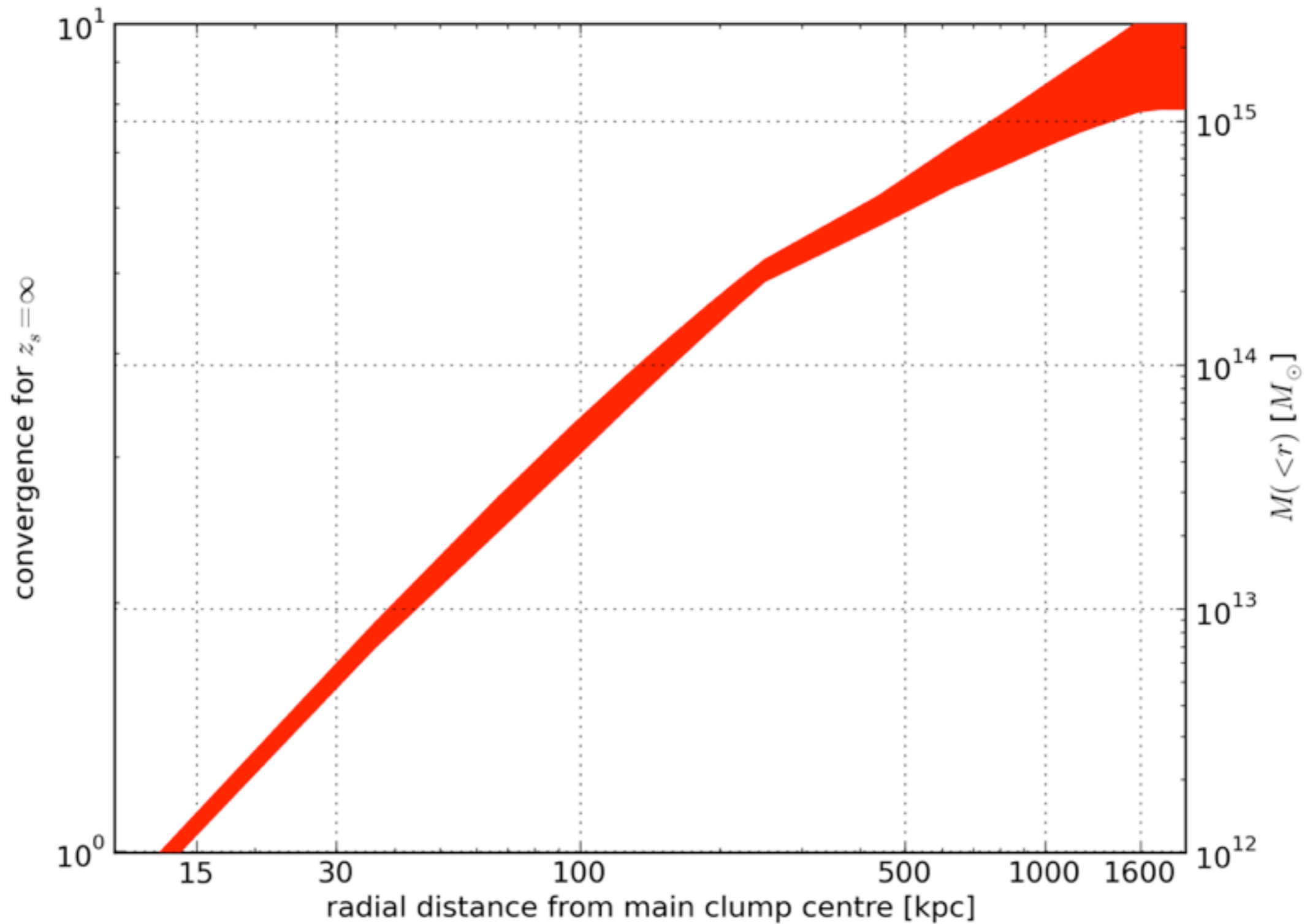


# Abell 2261: Reconstruction

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# Abell 2261: Profiles





# Upcoming improvements

**-We will largely benefit from HST WL...push me and Peter more to set that up.**

**-Some work on the error bars:  
Charles Majer,  
Eleonora Sarli,  
kang&kodos**



**-Magnification soon, maybe dynamics later, flexion and gas maybe even later**

# What's next...

- From nonparametric mass model you can derive a variety of quantities ( $M$ ,  $c$ , substructure content and masses)
- We would like to have similar models for at least two more CLASH clusters and some old friends (A1689, CL0024, A1703, A380...)
- Compare this subsample to numerical simulations. How shall be discussed