Looking for galaxy clusters in the CFH-LS using the Matched Filter Algorithm

$$D(r,m) = background + cluster \equiv b(m) + \Lambda_{cl} P_c(r/r_c)\phi_c(m - m^*)$$

from Postman et al., 1996

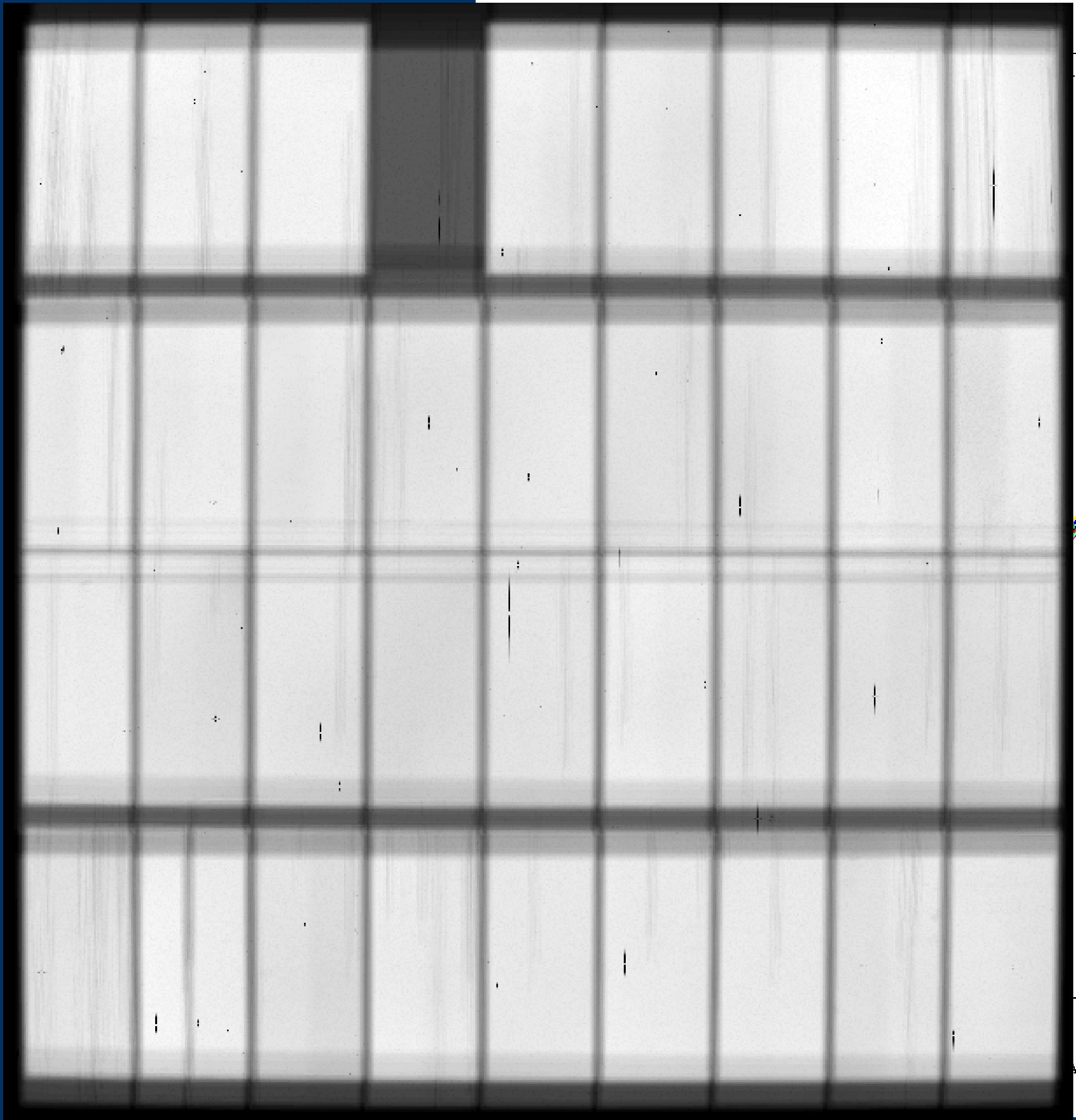
$$\ln L \propto \int P_c(r/r_c)\frac{\phi_c(m - m^*)}{b(m)} D(r,m)\, dr^2\, dm.$$

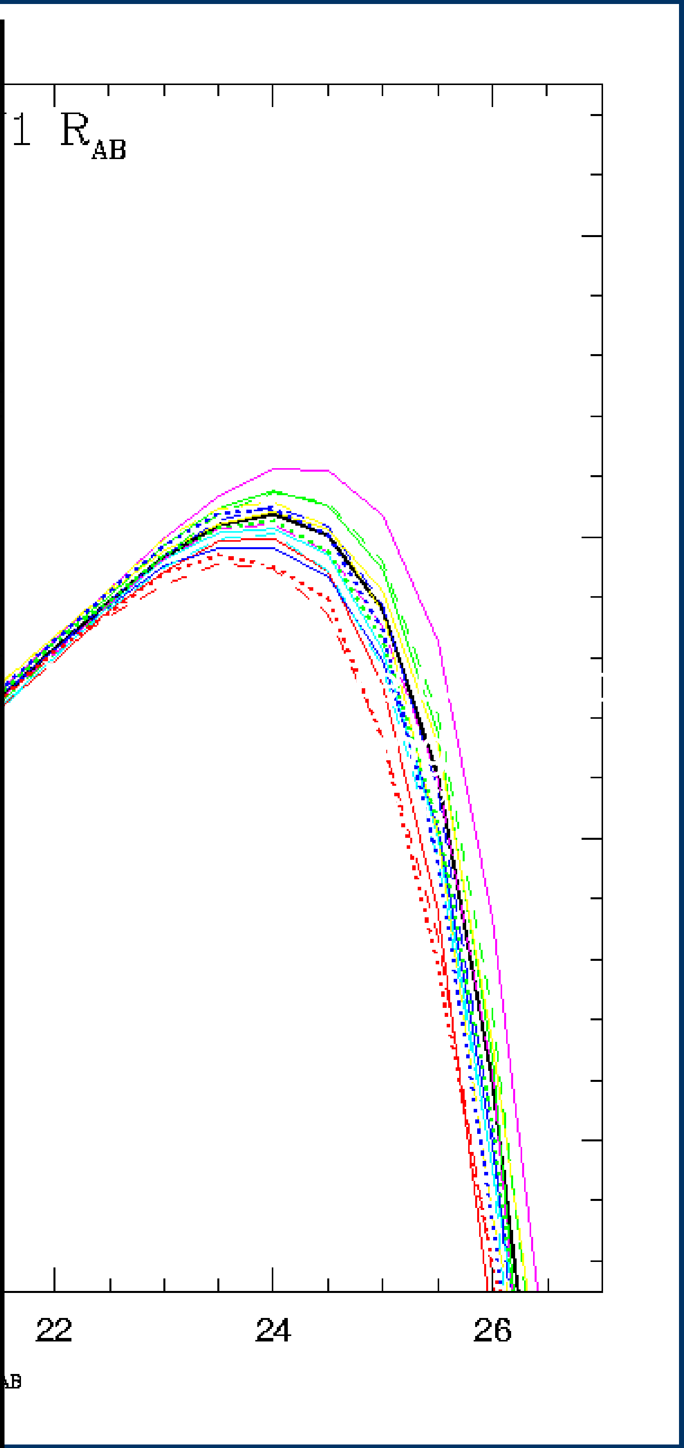
a spatial and luminosity filter is applied on the galaxy catalog (assuming a cluster profile and luminosity function)

we must adapt this cluster search algorithm for real survey data, with particular attention to techniques accounting for subtle variations in survey depths

Gladders & Yee (astro-ph/0411075) for Red-sequence Cluster Survey

Problems with wide fields





homogenous depth

$$S(i,j) = \sum_{k=1}^{N_g} P[r_k(i,j)]\, L(m_k)$$

the number of object defining the likelihood depends on magnitude limit of the source catalog

$$\int_0^{\infty} P(r/r_c)\, 2\pi r\, dr = 1;$$

$$\int_0^{m_{lim}} \Phi(m-m^*)\, dm = \int_0^{m_{lim}} \phi(m-m^*)\, 10^{-0.4(m-m^*)}\, dm = 1.$$

the normalisation of the luminosity filter depends on magnitude limit of the source catalog

$$\Lambda_{cl} = \frac{\left(\bar{S}(i,j)-1\right)\left(\int_0^{\infty} P(r/r_c)\, 2\pi r\, dr \int_0^{m_{lim}} \Phi(m-m^*)\, dm\right)^2}{\int \left[\frac{P^2(r/r_c)\,\phi(m-m^*)\,\Phi(m-m^*)}{b(m)}\right] dr\, dm}.$$

this is the equivalent number of L* galaxies in the cluster homogenous depth

non-homogenous depth

$$S(i,j) = \sum_{k=1}^{N_g} P[r_k(i,j)] L(m_k),$$

signal

$$S(i,j) = \sum_{k=1}^{N_g} P[r_k(i,j)] L(m_k \leq m_{(lim)_k}),$$

normalisation

$$\int_0^{\infty} P(r/r_c) 2\pi r \, dr = 1;$$

$$\int_0^{r_{co}} P(r/r_c) 2\pi r \left(\int_0^{m_{lim}(r)} \Phi(m - m^*) dm \right) dr = 1.$$

$$\int_0^{m_{lim}} \Phi(m - m^*) dm = \int_0^{m_{lim}} \phi(m - m^*) 10^{-0.4(m-m^*)} dm = 1.$$

$$\Lambda_{cl} = \frac{\left(\bar{S}(i,j) - 1\right) \left(\int_0^{\infty} P(r/r_c) 2\pi r \, dr \int_0^{m_{lim}} \Phi(m - m^*) dm \right)^2}{\int \left[\frac{P^2(r/r_c) \phi(m-m^*) \Phi(m-m^*)}{b(m)} \right] dr\, dm}.$$

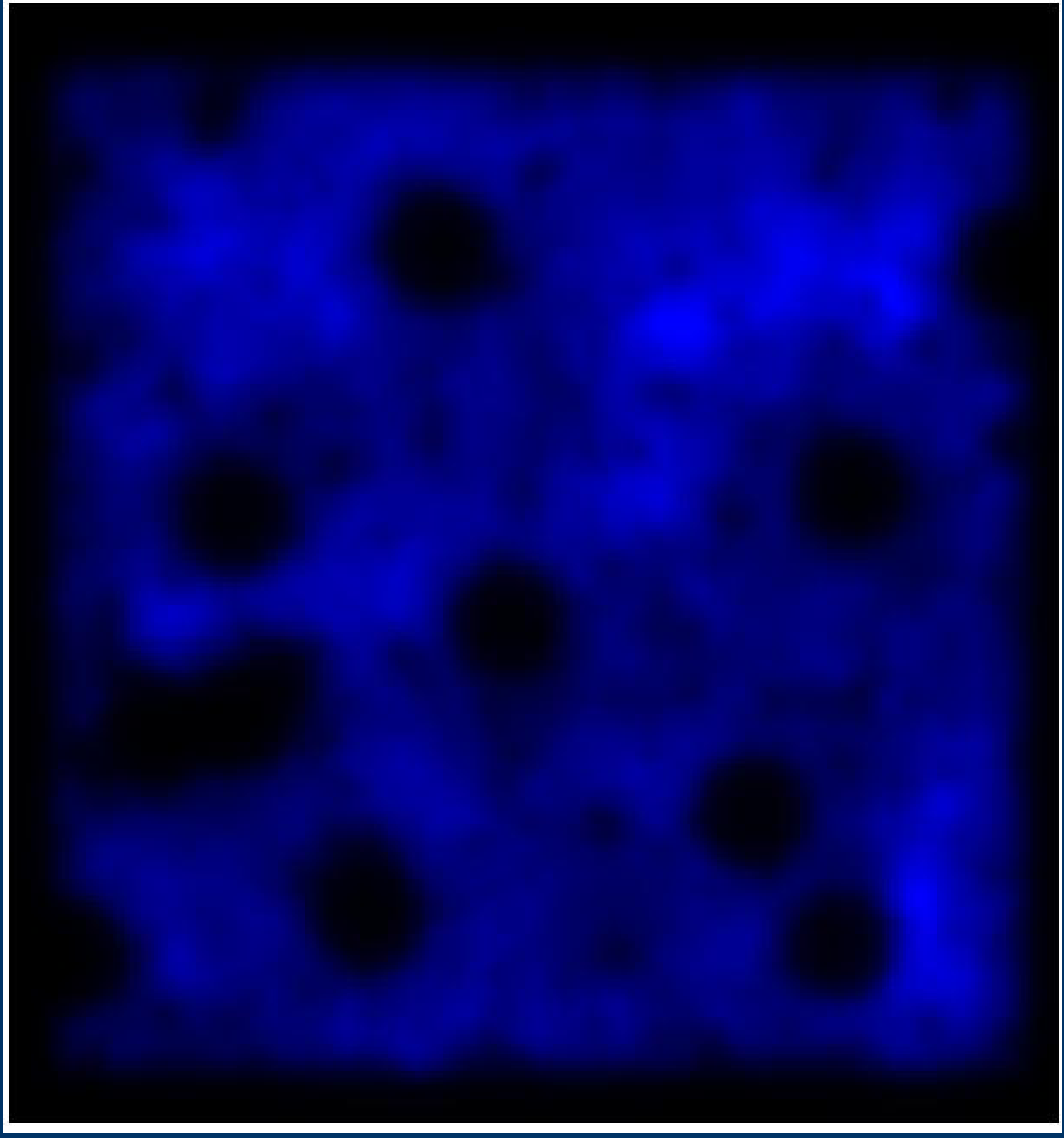
richness

$$\Lambda_{cl} = \frac{\left(\bar{S}(i,j) - 1\right) \left(\int_0^{r_{co}} P(r/r_c) 2\pi r \left(\int_0^{m_{lim}(r)} \Phi(m - m^*) dm \right) dr \right)^2}{\int_0^{r_{co}} P^2(r/r_c) 2\pi r \left(\int_0^{m_{lim}(r)} \frac{\phi(m-m^*)\Phi(m-m^*)}{b(m)} dm \right) dr},$$

Marmo et al., 2005

Likelihood maps are generated at different redshifts

z=0.1



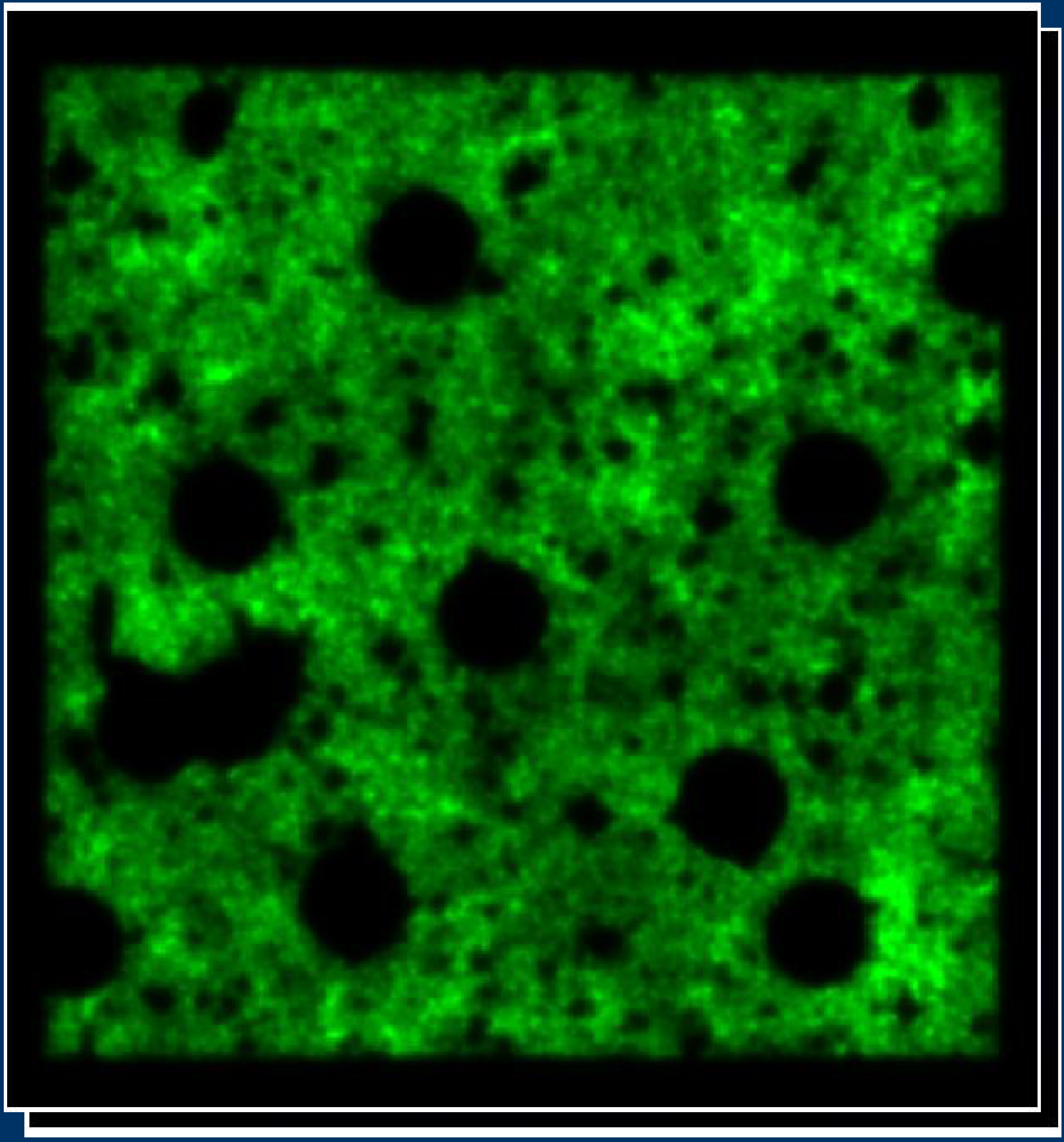
peaks are identified in every map

peaks from different slices are cross-correlated

Likelihood maps are generated at different redshifts

z=0.1

z=0.6

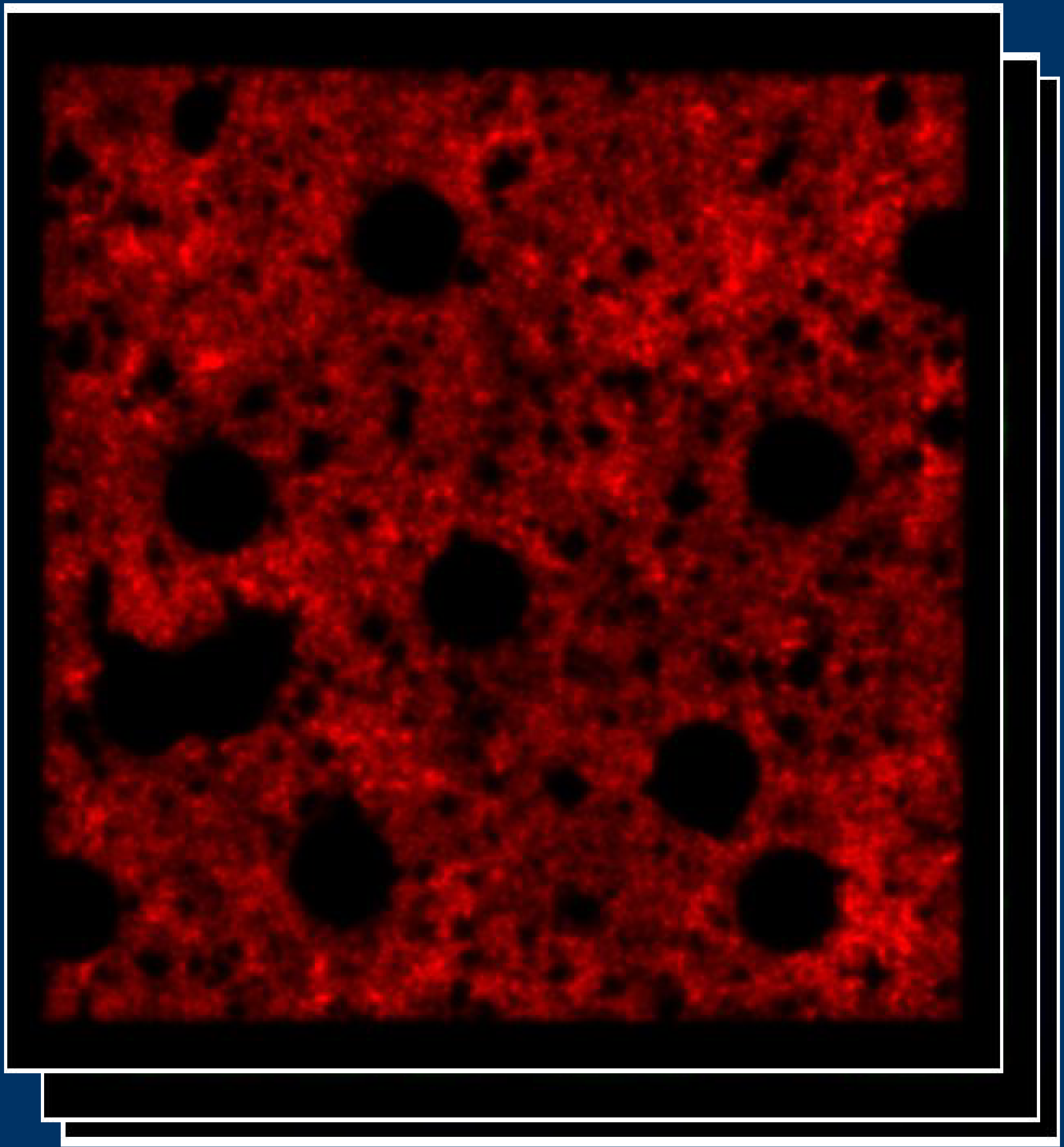


peaks are identified in every map

peaks from different slices are cross-correlated

Likelihood maps are generated at different redshifts

z=0.1
z=0.6
z=1.1



peaks are identified in every map

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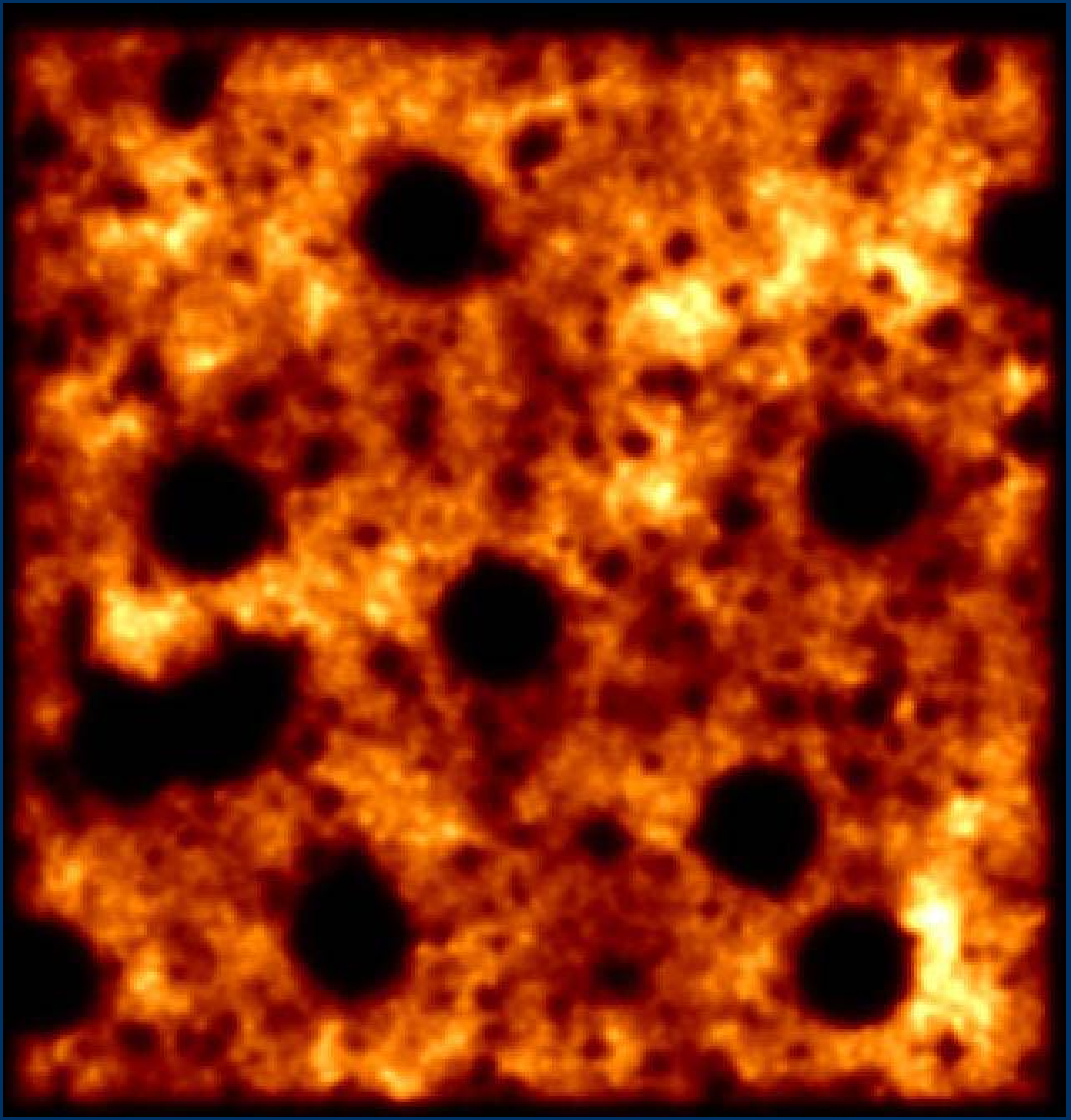
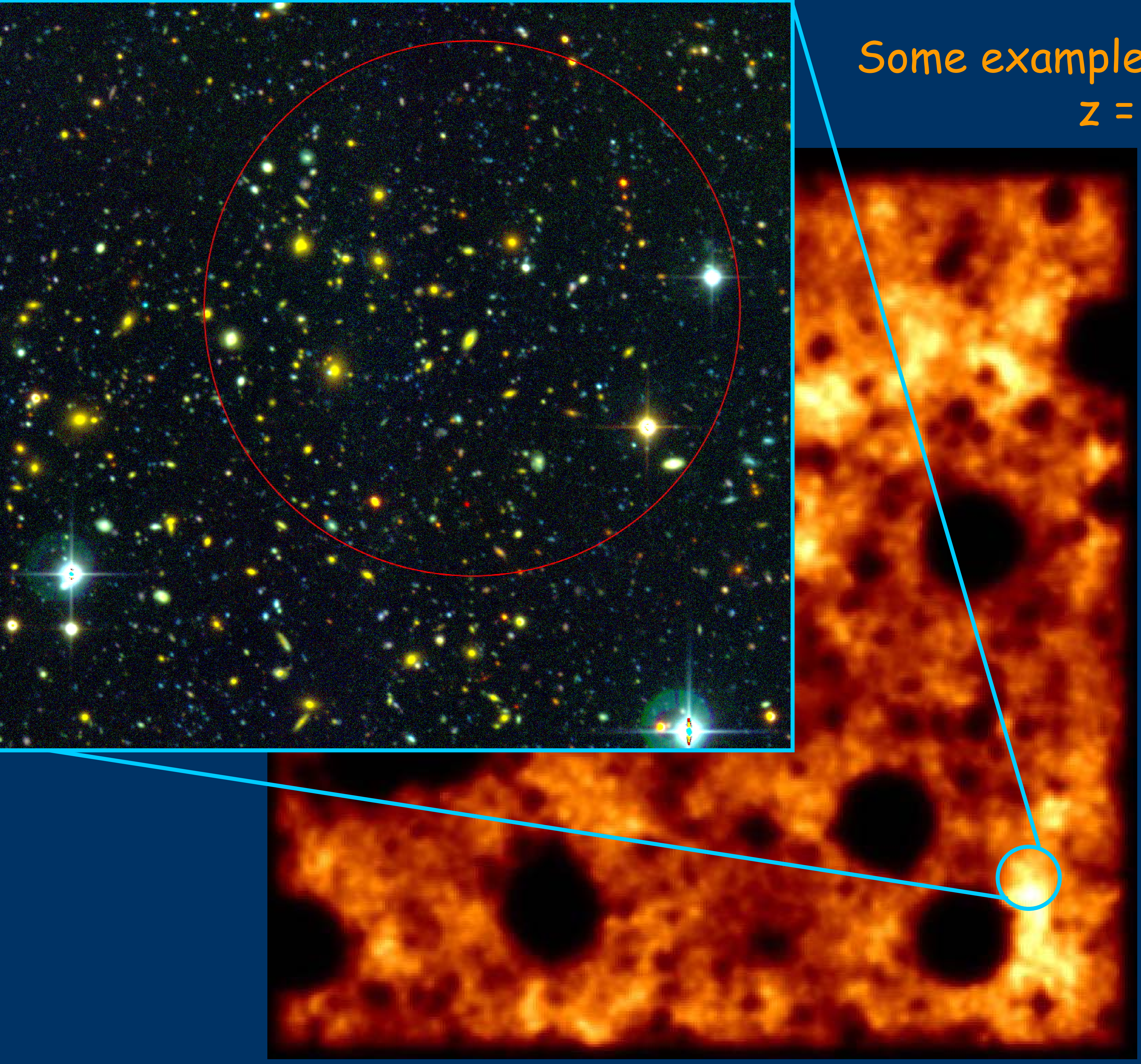
Some examples of detection

z = 0.3

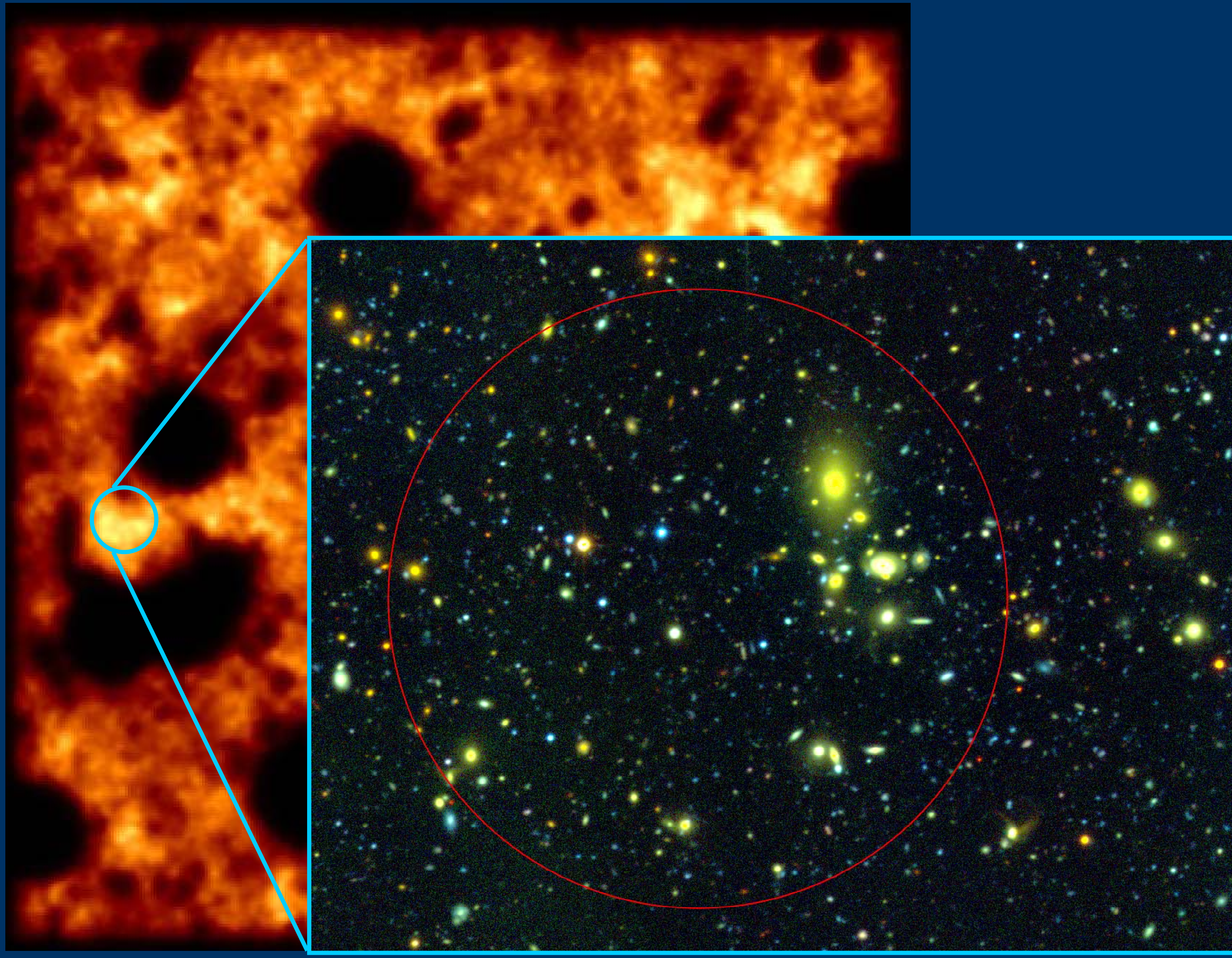


Some examples of detection

z = 0.3

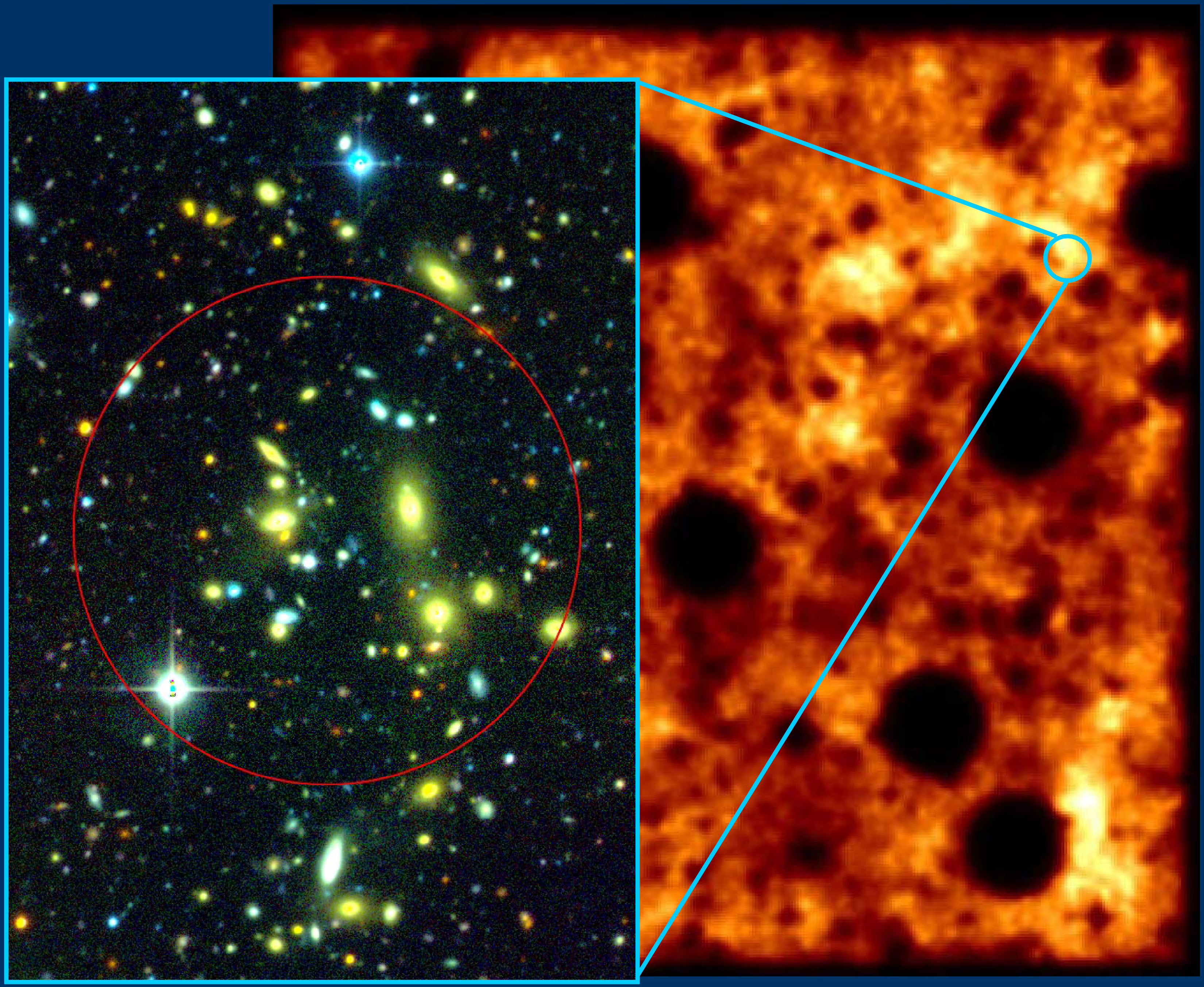


Some examples of detection
z = 0.3

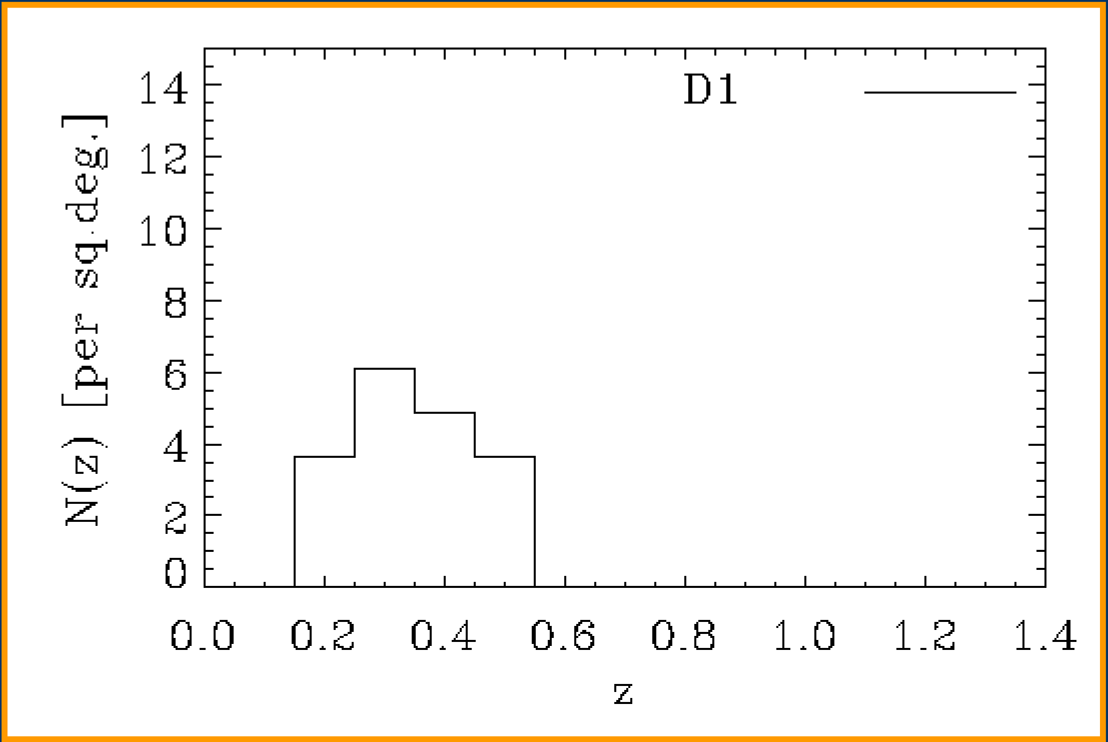


Some examples of detection

$z = 0.3$

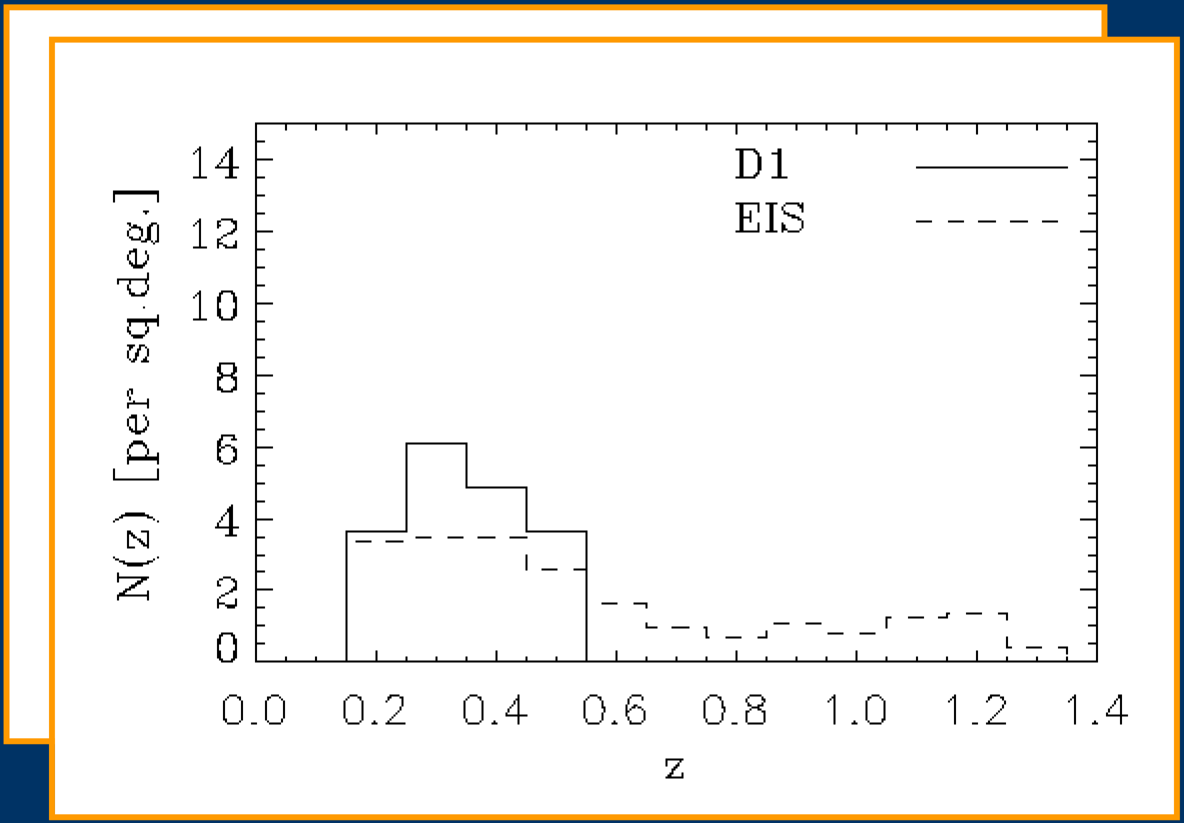


Preliminary results



redshift distribution of matched filter detections on D1 field

Preliminary results

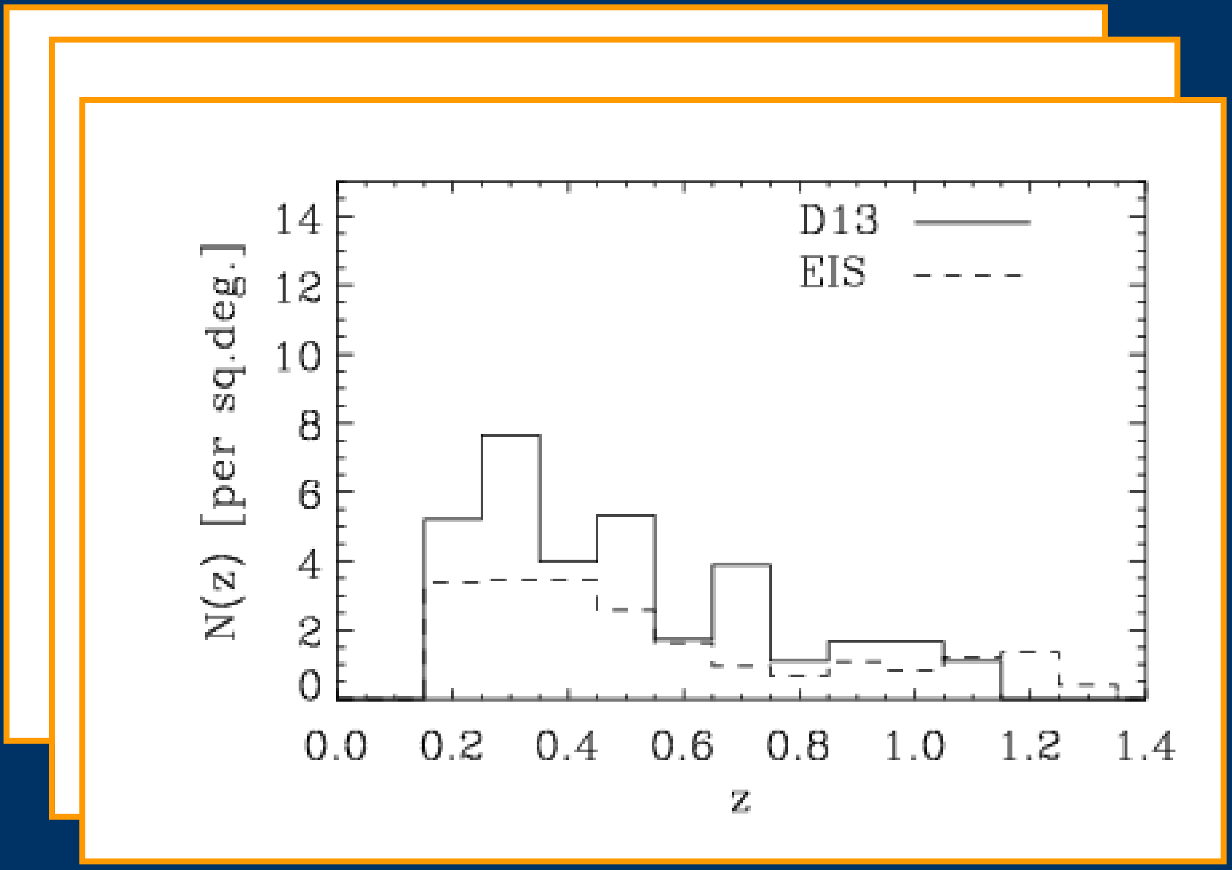


redshift distribution of matched filter detections on D1 field

comparison with redshift distribution of EIS detections (15 deg^2)

Olsen et al. (1999)

Preliminary results



redshift distribution of matched filter detections on D1 field

comparison with redshift distribution of EIS detections (15 deg^2)
Olsen et al. (1999)

redshift distribution of matched filter detections on D1 and D3 fields compared to redshift distribution of EIS detections

Perspectives immédiates

- **Comparaisons** exhaustives des différentes méthodes sur les Deeps
  (MF, RS, Zphot et X sur D1)

- Meilleure gestion des **masques**
  est il possible de récupérer une partie des zones masquées (ghosts)?

- **Simulations**

- **W1**

- **Requêtes**:
  - Masques sur image chi2 ?;
  - Images chi2 RIz ou Iz (objets rouges) ?
  - Catalogues en format LDAC ?