



# Keywords of **A**stronomical **F**its images **E**xplorer

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ICT - 1st December 2017

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# Objectives

Create an interface that

offers FITS image classification

image-based analysis features

image component catalogue cross-matching and field selections

is suited to archive mining projects

applicable to a range of mm/sub-mm instruments

offers flexibility for further software development



**Inputs: FITS files**

classification

continuum/polarization

CUBE

**IMAGE FILTER SELECTION**

**FITS IMAGE SUB-SAMPLE diagnostics**

**continuum/polarization diagnostics**

**KEYWORDS**

**cube diagnostics**

**components**

**cont. analysis**

**cube analysis**

**spectrum**

**visualization**

- source detection
- morphological indicators
- polarization maps

- radial cuts
- azimuthal average
- light curves
- SED plots

- sources detection
- line detection
- continuum detection
- continuum subtraction
- line fit

- spectral slabs
- spectrum around max
- contour-defined spectrum
- Voronoi defined spectrum
- inner quarter spectrum

- 3D cube view
- channel maps
- moment maps

**FITS SUB-SAMPLE classification/visualization**

**catalogue cross-match**

**composite field plot**

**Image component redshifts**

**OUTPUTS: diagnostic plots, fits files with metadata, sub-sample and source classification diagnostics**

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filters

POS RANGE	<input type="text" value="0"/>	CNTRFREQ RANGE	<input type="text" value="0"/>	FREQRES RANGE	<input type="text" value="0"/>
ANGRES RANGE	<input type="text" value="0"/>	CHANRMS RANGE	<input type="text" value="0"/>	FLUXTOTAL RANGE	<input type="text" value="0"/>

### requested keywords

- ALL
- RA\_centre
- DEC\_centre
- SPATRES
- BNDCTR
- BNDRES
- BNDWID
- CHANRMS
- DYNRANGE
- FLUXTOT
- DATAMAX
- DATAMIN
- STOKES

### spectrum analysis options

- ALL
- 3D view
- continuum subtraction
- Channel gallery
- moments
- Spectrum inner quarter
- Spectrum around max
- Spectrum slabs
- Spectrum contour
- Spectrum Voronoi
- Spectral fit

### further analysis options

- ALL
- Source detection
- Source detection SNR layer
- radial average
- Image cuts
- power spectrum
- entropy
- morphological analysis
- SED plot
- SED fit-GB
- SED fit-line
- Light curve
- Polarization maps

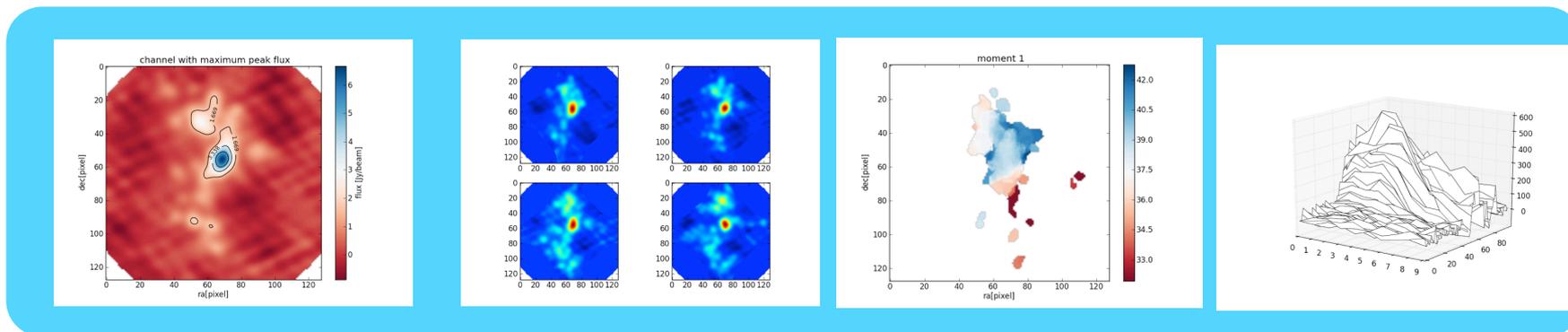
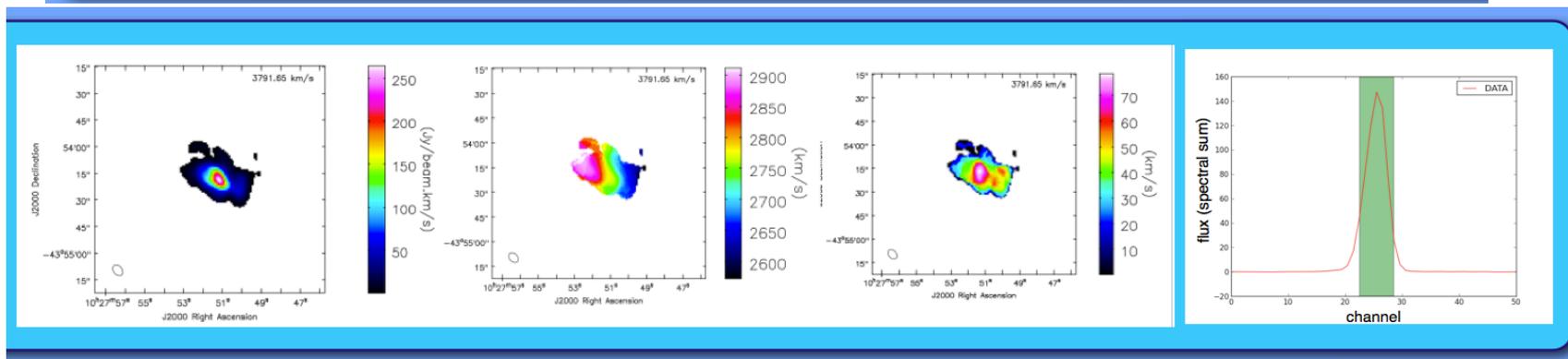
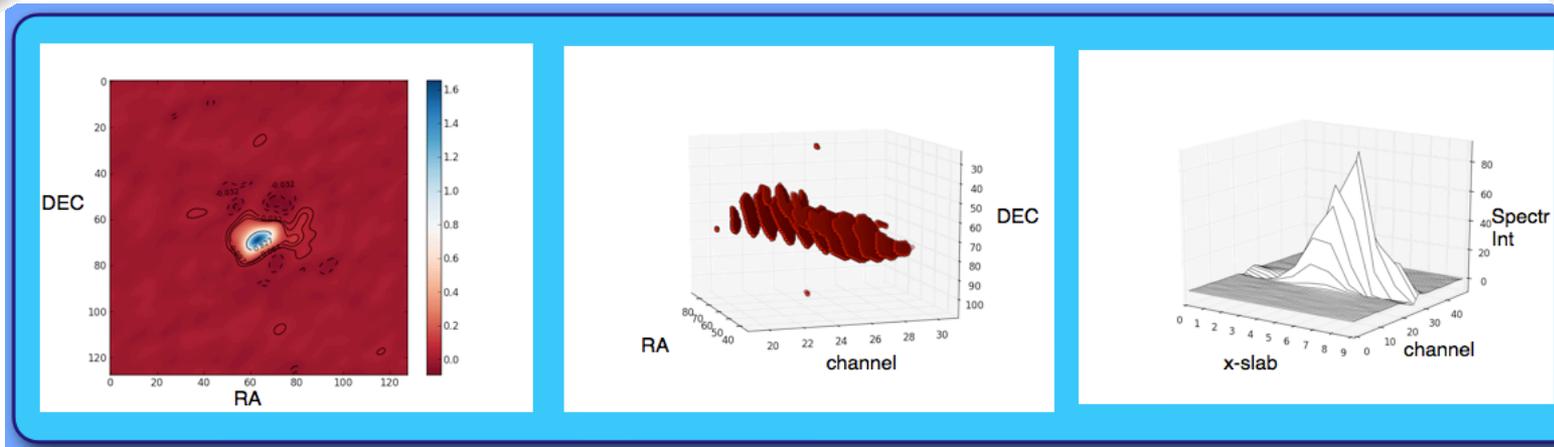
### image query

- catalogue/field cross-match  image component redshift catalogue cross-match  keyword insertion into Fits file(s)  gap diagnostic plots
- DustPedia cross-match  3-colour image  composite field (FOV)  composite field (contour)

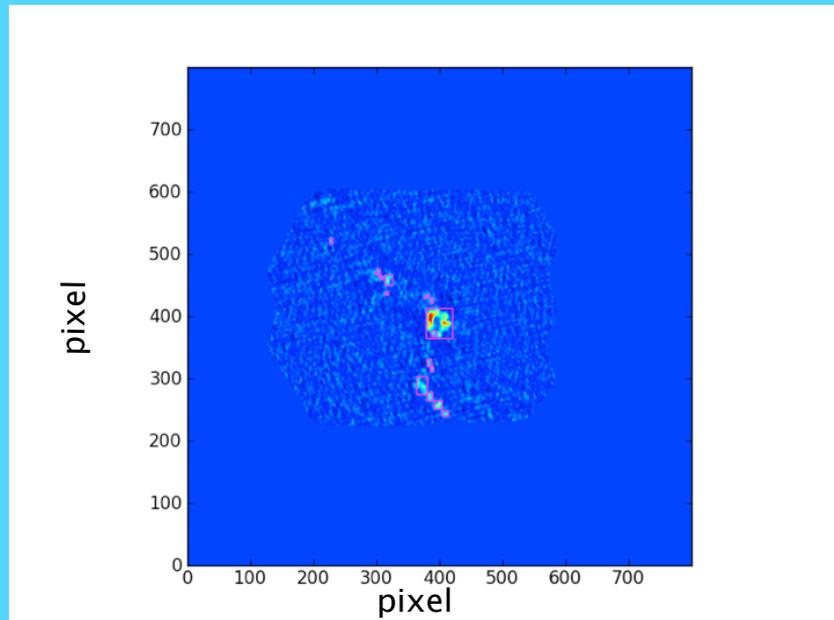
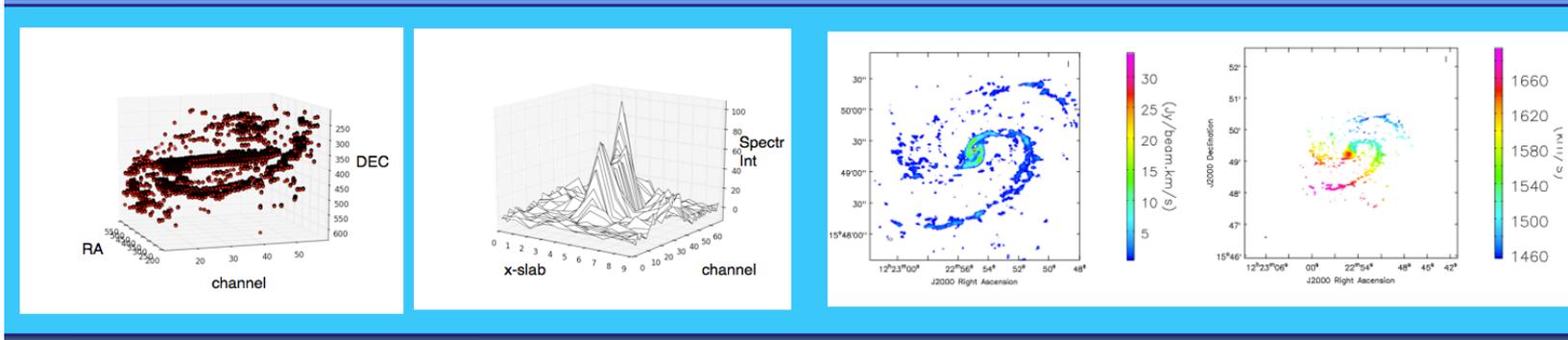
process

**automatic image post-processing**

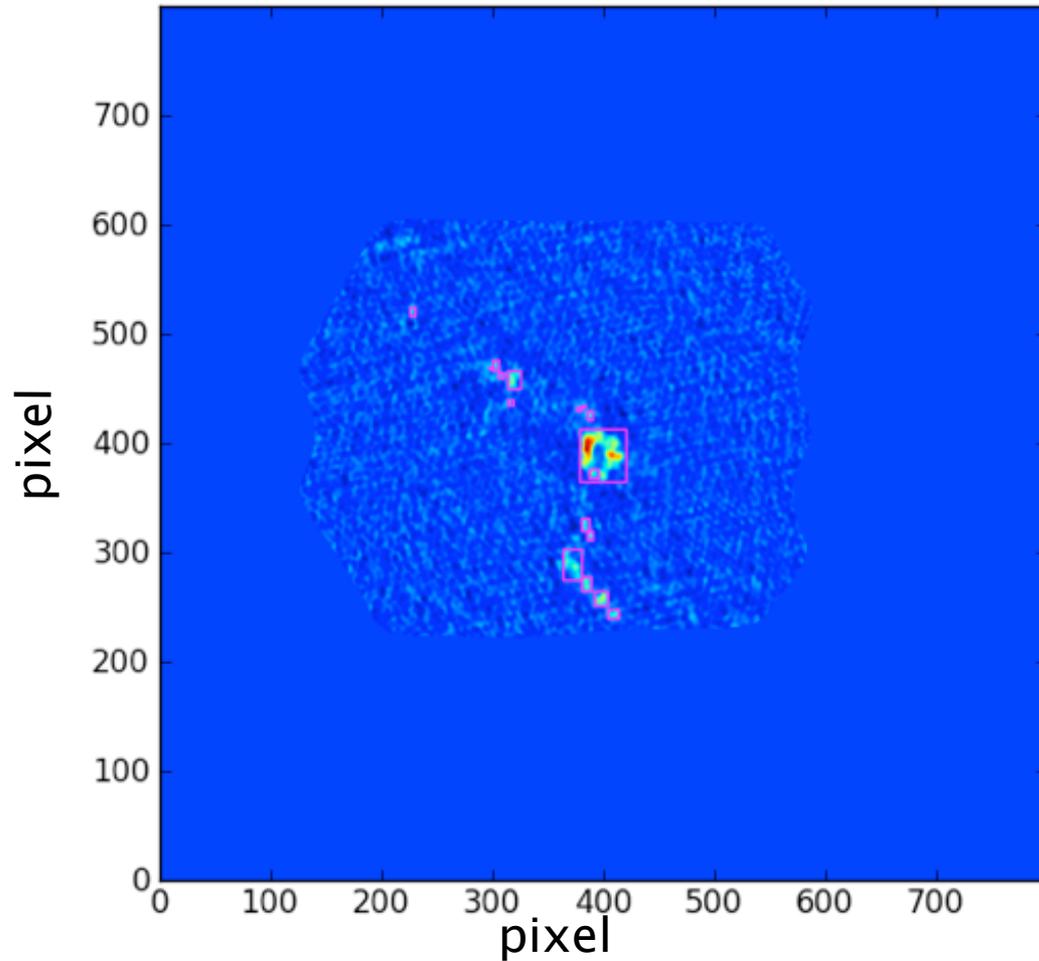
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# KAFE



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filters

POS RANGE	<input type="text" value="0"/>	CNTRFREQ RANGE	<input type="text" value="0"/>	FREQRES RANGE	<input type="text" value="0"/>
ANGRES RANGE	<input type="text" value="0"/>	CHANRMS RANGE	<input type="text" value="0"/>	FLUXTOTAL RANGE	<input type="text" value="0"/>

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- DYNRANGE
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- DATAMAX
- DATAMIN
- STOKES

### spectrum analysis options

- ALL
- 3D view
- continuum subtraction
- Channel gallery
- moments
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- Spectrum around max
- Spectrum slabs
- Spectrum contour
- Spectrum Voronoi
- Spectral fit

### further analysis options

- ALL
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- power spectrum
- entropy
- morphological analysis
- SED plot
- SED fit - GB
- SED fit - line
- Light curve
- Polarization maps

image query

catalogue/field cross-match  image component redshift catalogue cross-match  keyword insertion into Fits file(s)  gap diagnostic plots

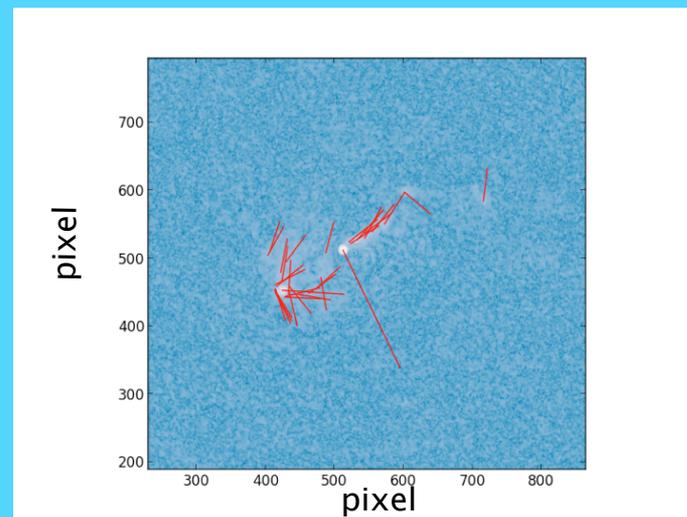
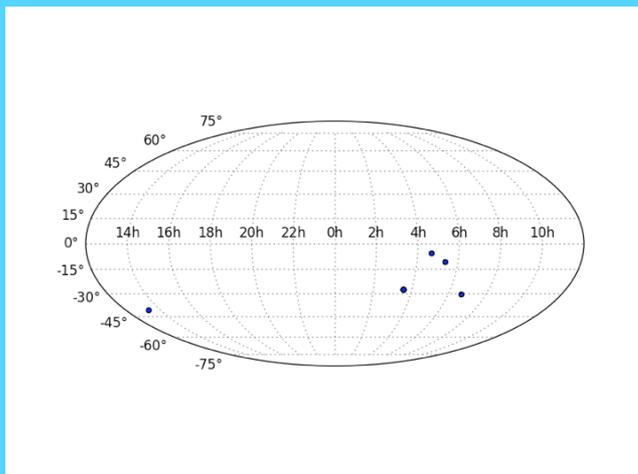
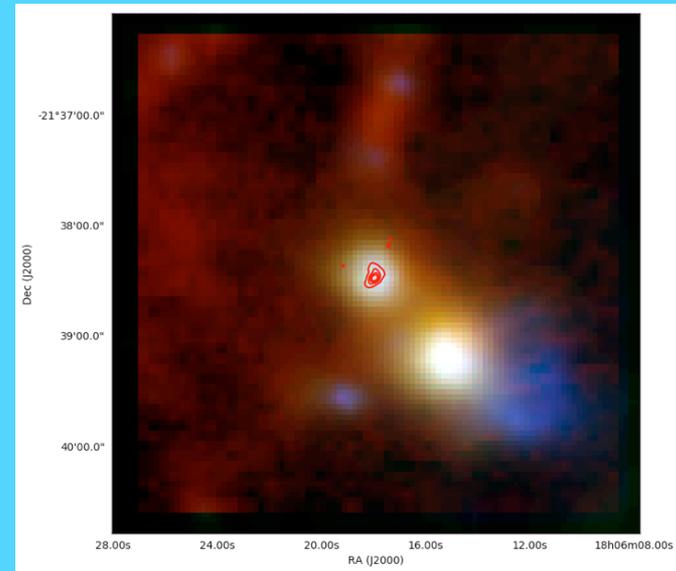
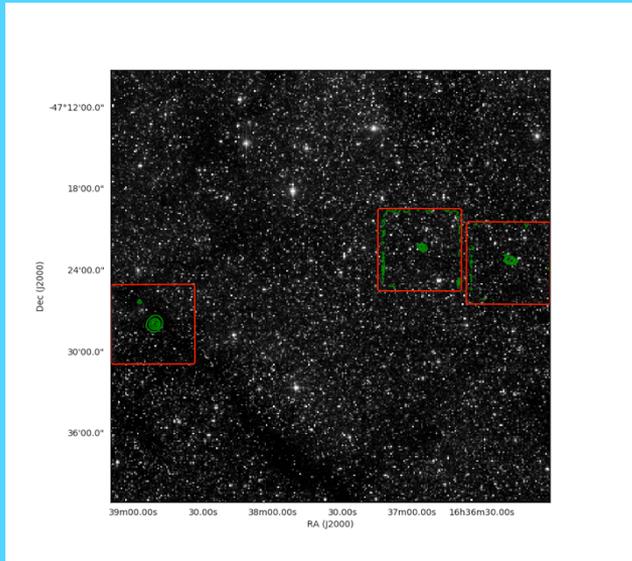
DustPedia cross-match  3-colour image  composite field (FOV)  composite field (contour)

process

**automatic image post-processing**



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```
#####test.fits#####
```

```
RA:          20.916 deg
DEC:         33.256 deg
SPATRES:     0.002 arcsec
BNDCTR:     5022427500.0 Hz
BNDRES:     64000000.0 Hz
BNDWID:     64000000.0 Hz
CHANRMS:    6.14e-05 Jy/beam
DYNRANGE:   26.24
FLUXTOT:    0.0023 Jy
DATAMAX:    0.0016 Jy/beam
DATAMIN:    -0.0001 Jy/beam
STOKES:     ['I']
```

## Keywords

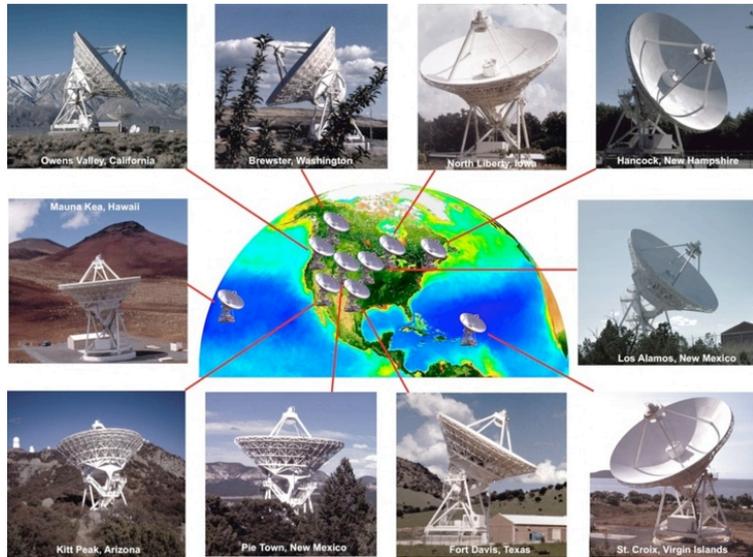
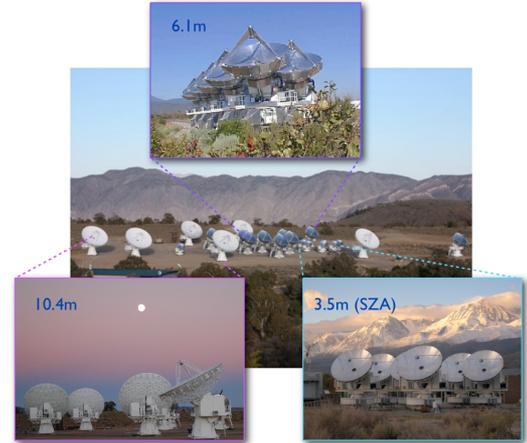
```
#####test2.fits#####
```

```
RA:          18.258 deg
DEC:         33.2560645833 deg
```

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[kafe@ira.inaf.it](mailto:kafe@ira.inaf.it)

# KAFE



Australia Telescope Compact Array



# Scientific applications

## Examples

- **ALMA Re-Imaging development study**  
(PI M. Massardi, Giannetti et al. In prep)
- **ALMACAL** -- AGN statistics (Bonato et al. in prep)  
-- mm vs  $\gamma$ -rays in RL AGN (Liuzzo et al. in prep)
- **High-z galaxy evolution** (Mancuso et al. in prep)
- **Polarization properties of PACO sources** (Galluzzi et al. 2017)
- **Sz emission in galaxy clusters** (Burkutean et al. in prep)

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IMAGE FILTER SELECTION

FITS IMAGE SUB-SAMPLE diagnostics

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FITS SUB-SAMPLE classification/visualization

cross-match

composite field plot

Image component redshifts

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