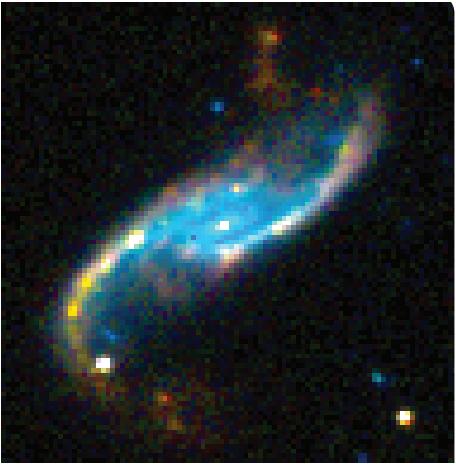




# Creating an updated, scientifically-calibrated mosaic imaging pipeline for the RC3 Catalogue

Jung Lin Lee<sup>1</sup>, Robert J. Brunner<sup>2</sup>

<sup>1</sup>Department of Astronomy, University of California at Berkeley, <sup>2</sup>Department of Astronomy, University of Illinois Urbana-Champaign



## Introduction

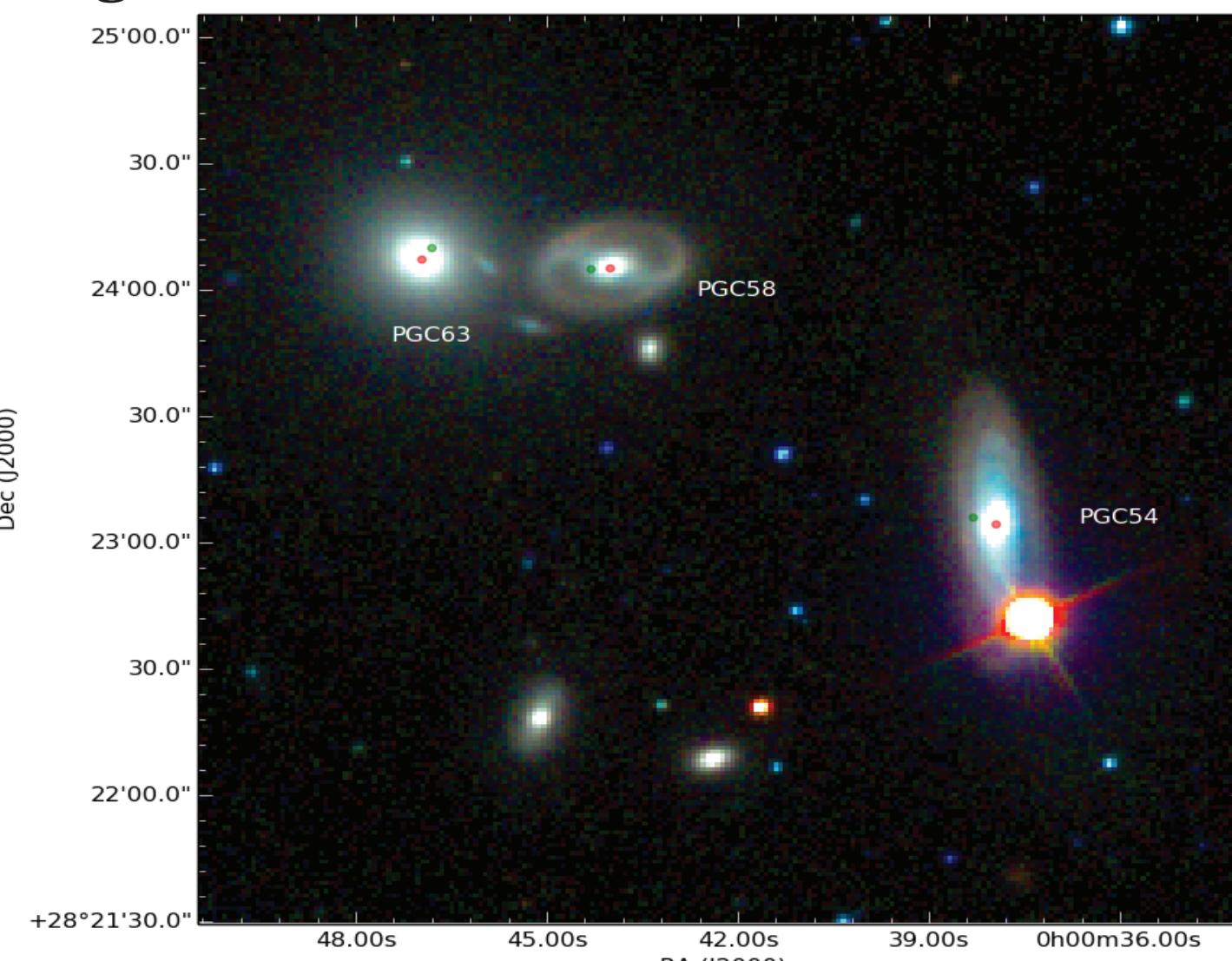
- 23011, large, bright, nearby galaxies
- Popular catalog for both morphological and cosmological studies
  - NYU VAC, NASA-Sloan Atlas, EFIGI Catalogue
- RC3 samples fairly completely and uniformly, but the catalog (from ~1990s, including subset from RC2 [1976] ) suffer from large positional uncertainties.



## Imaging Data:

Survey	SDSS	POSS-II
Bands	u,g,r,i,z	R,B,I
Coverage	35.28 % (N)	78.27%
Resolution	0.396''/pix	78.27''/pix
Technique	CCD	Photographic Plates

## Algorithms:

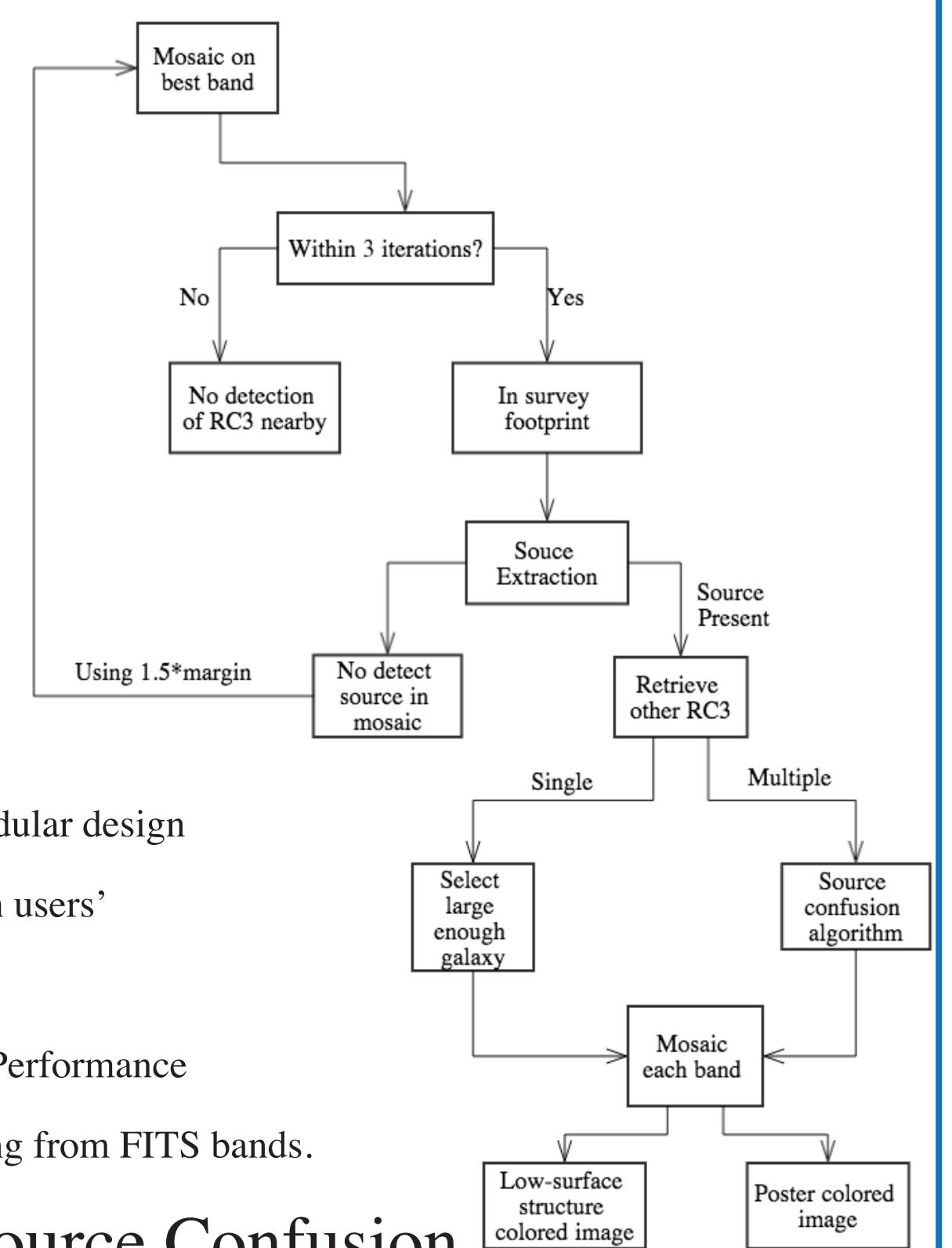


## Algorithms:

- Goal:**
- 1 . Generate Mosaics from Input Fields
  2. Updating Astrometry by finding the sources

### Solution:

*Source-finding by recursively generating mosaics from more neighboring fields*



## Resolving Source Confusion Problem :

- Large galaxies often reside near other galaxies, or in clusters
- Can not rely on the existing astrometry from catalog (large uncertainties)

=> How do I tell which galaxy is which?

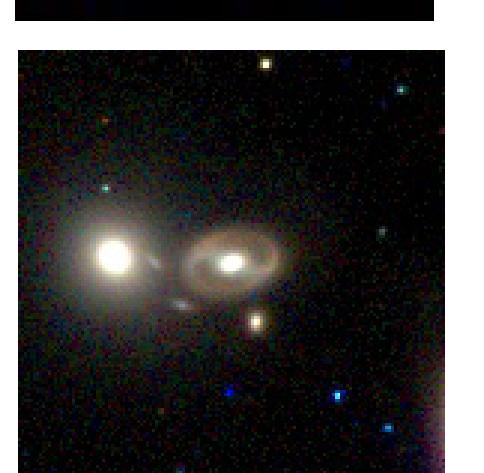
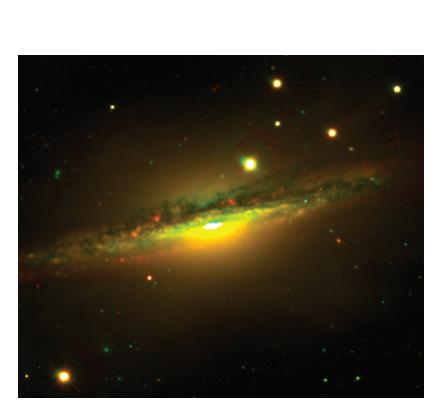
- Example:

Before Source Confusion algorithm, ambiguous

- Ideally one RC3 per image, centered:

After Source Confusion algorithm:

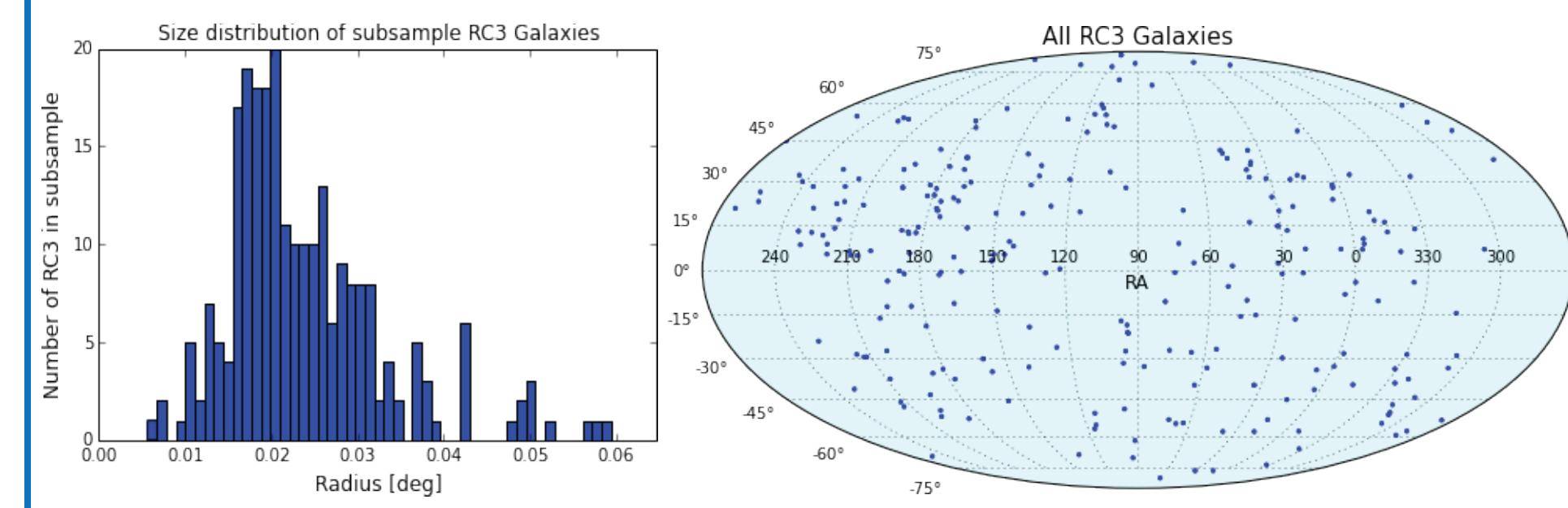
- Clearly centered at one galaxy



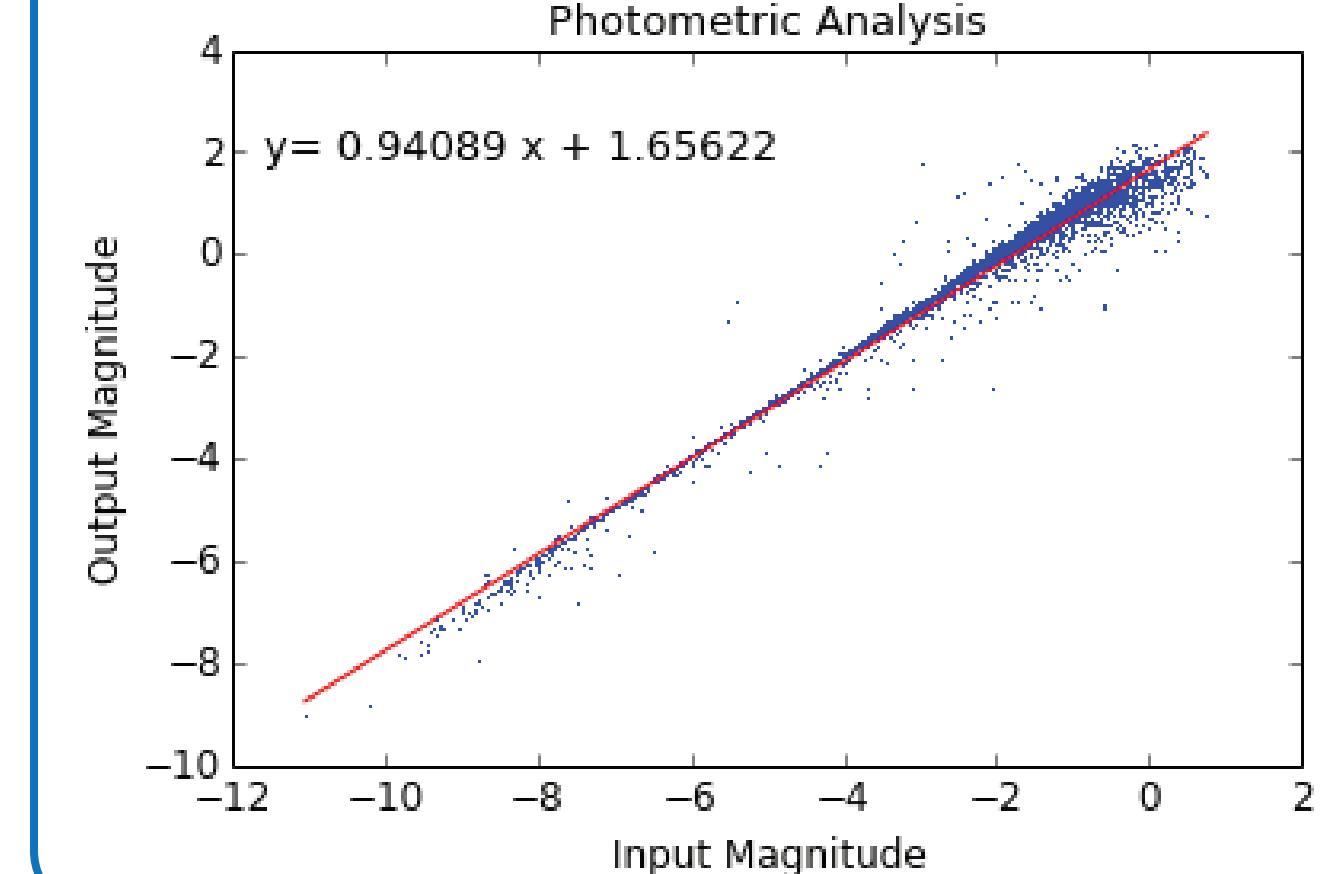
## Science-quality Verification

- Matching extracted sources in input and output images
- Astrometric Fidelity (within  $\leq 5 \times 10^{-4}$  deg)
- Photometric Analysis with random sample of 250 RC3

- Uniform distribution in spatial location and size.



- The mosaic pipeline preserves the photometric quality of the original FITS



## Pipeline:

Survey-independent:



- Wavelength independent  
- Increase sky coverage

Catalog-Independent:

Open-Source:



## Data Products:

SDSS:

- 4283 RC3s improved astrometry > 1'
- 41% catalog coverage

POSS-II:

- 3431 RC3s improved astrometry > 1'
- Full catalog coverage

Web Searchable Database and Gallery:

- <http://lcdm.astro.illinois.edu/data/rc3/search.html>

Potential Applications:

- Target selection
- Masking bright extended sources
- Model-fit light distribution of galaxy
- Spectroscopic fiber placement

## Acknowledgements

The work was supported by the Google Summer of Code Program. RJB would also like to acknowledge support from the National Science Foundation Grant No. AST-1313415. We thank Harold G. Corwin Jr. for helpful discussion that helped this work.