The Yale/ODI Survey(s)

- High-level goals & parameters of survey
- Science cases (more in specific area talks)
- Management structure, kinds of survey project
- Goals of this meeting
- Strawman observing strategy

The Yale/ODI Survey(s)

- 150 nights (50/yr) likely to be allocated by Yale to the survey
- Extensions and add-ons will likely propose for additional time
- Goals:
  - Provide basis for scientific projects by Yale and non-Yale PIs
  - Take advantage of excellent image quality
  - Exploit time domain from individual images and create deep summed images
  - Leverage data from current/past surveys; serve as precursor for future surveys
- Survey definition currently underway – observing plan to be fixed shortly after this workshop
- Community participation welcome!

The Yale/ODI Survey: Image Quality

- OPTIC and QUOTA observations suggest median i-band seeing ~0.45″
- Pixel scale 0.11″

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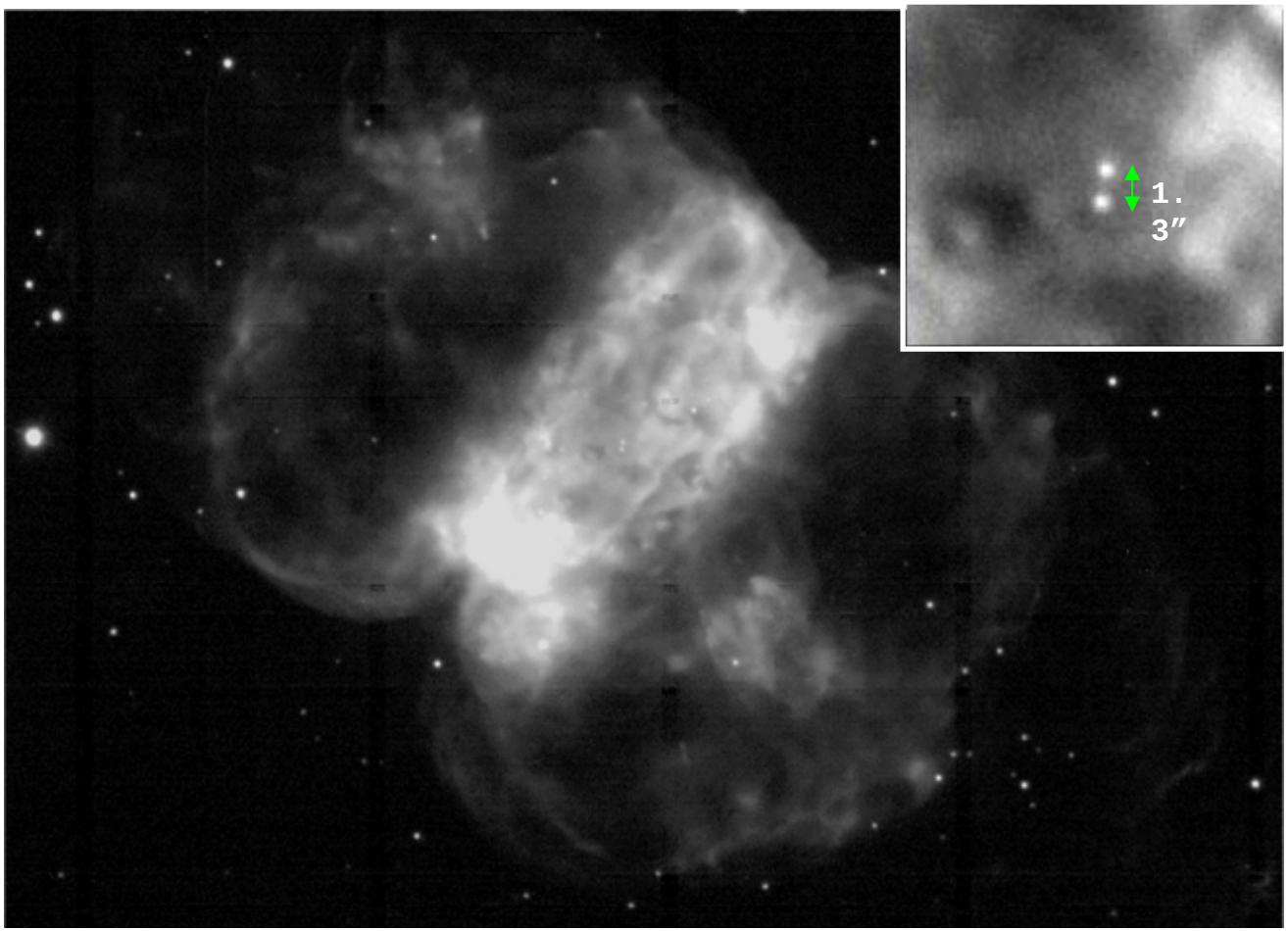

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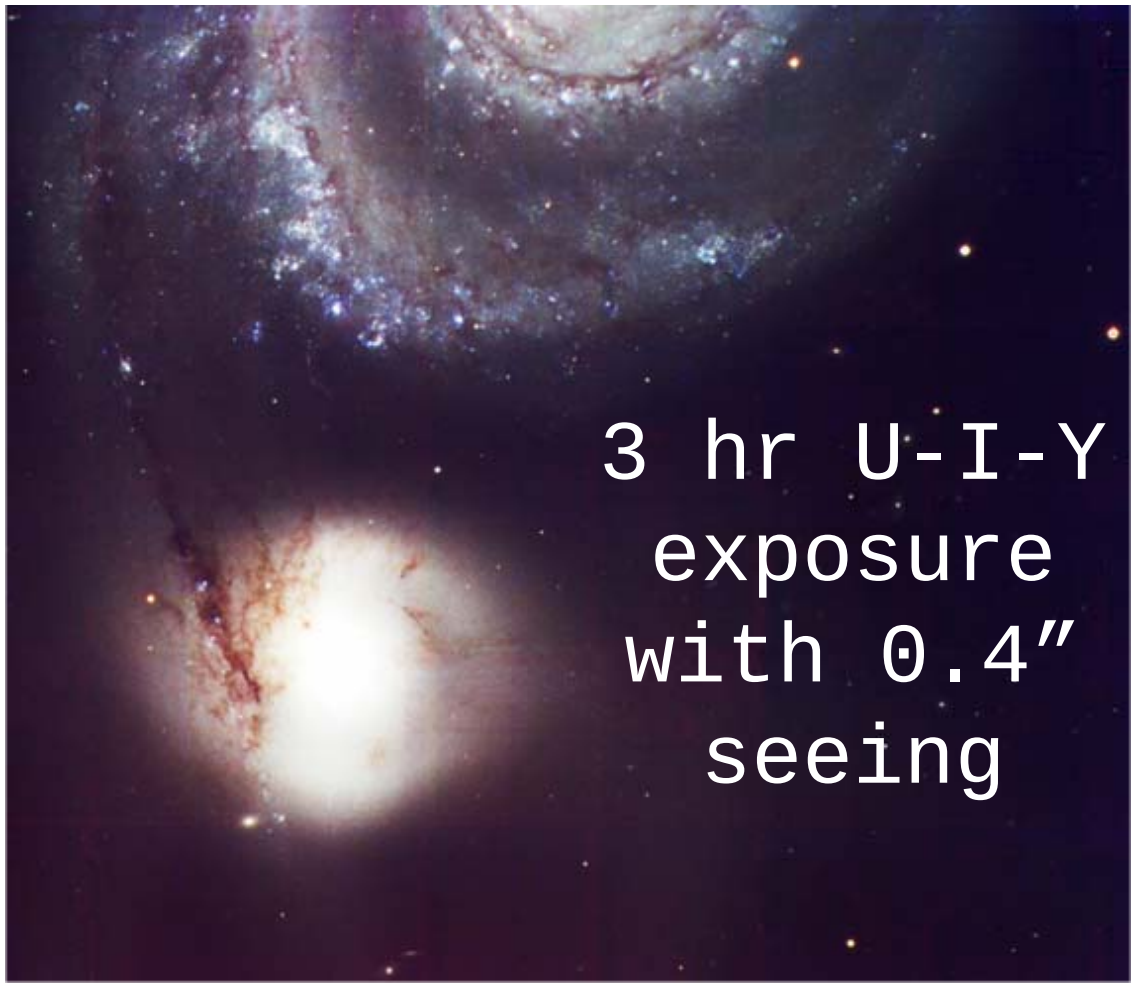


The Yale/ODI Survey: Area vs. Image Quality

- Entendue is good, but not unique (Dark Energy Camera 4 times greater)

- WIYN/ODI image quality excellent (modern telescope, orthogonal transfer, small pixels)

- Unique science in situations where image quality is critical – wide-area coverage less compelling

The Yale/ODI Survey: Science

Primary science goals focus on high image quality and time domain:

Image quality projects:

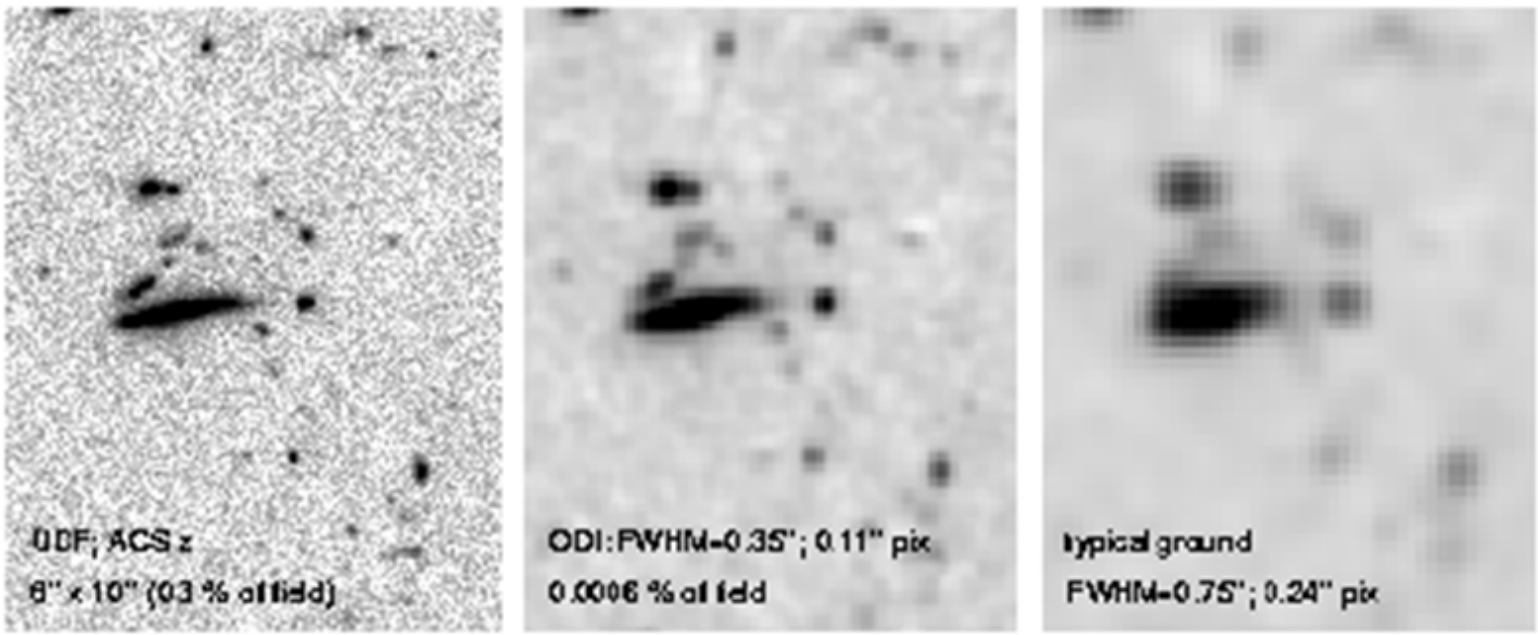
- High-z galaxy morphology
- galaxy-cluster; galaxy-galaxy lensing
- faint galactic/local group photometry
- astrometry (see time domain)

Time domain projects (variability, not transients):

- identification and period of pulsators
- identification and period of binaries
- non-periodic variables: AGN, CVs and flare stars
- astrometry (see image quality)

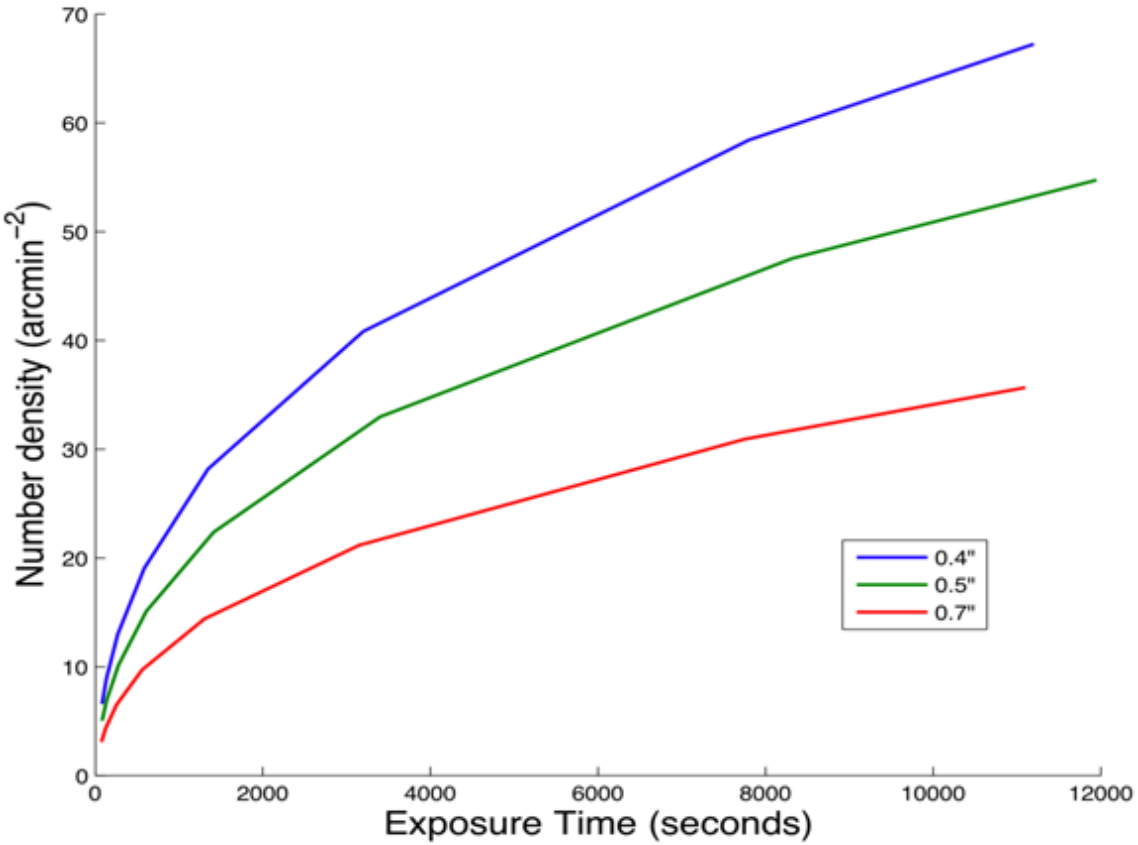
The Yale/ODI Survey: High-z Galaxy Morphology

- Group Leaders: Pieter van Dokkum, Nikhil Padmanabhan
- Key: many galaxies have sizes comparable to ~0.5″
- Morphology measurements possible for much wider range of targets
  - sizes
  - structure (disk vs bulge)
  - surface brightness profiles



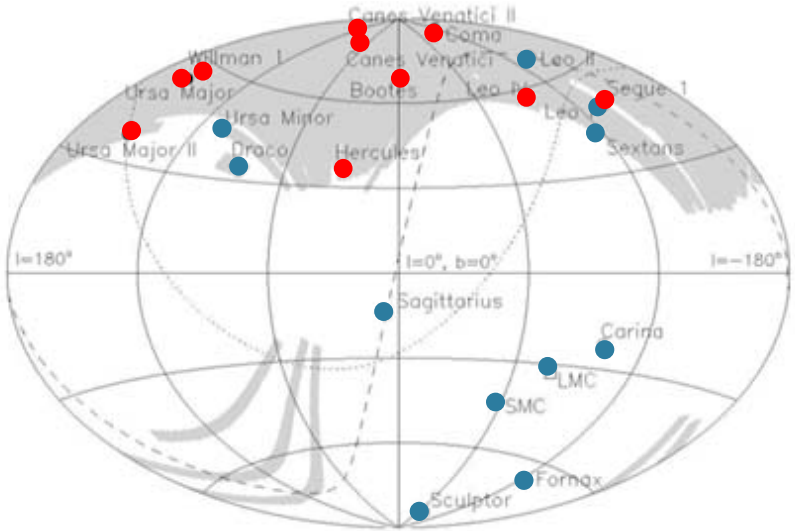
The Yale/ODI Survey: Gravitational Lensing

- Group Leaders: Ian Dell'Antonio, Nikhil Padmanabhan
- Good image quality leads to more measurable galaxy shapes per area
- Key for galaxy-cluster and galaxy-galaxy lensing



The Yale/ODI Survey: Galactic/Local Group Photometry

- Group Leader: Marla Geha
- 12 new dwarf galaxies discovered near Milky Way since 2005 through
  stellar overdensities in SDSS
- Given incompleteness, may be as many as 400 more (Tollerud et al. 2008)
- Background galaxy contamination increases dramatically at r>23
- Galaxy/star separation will be key to future progress



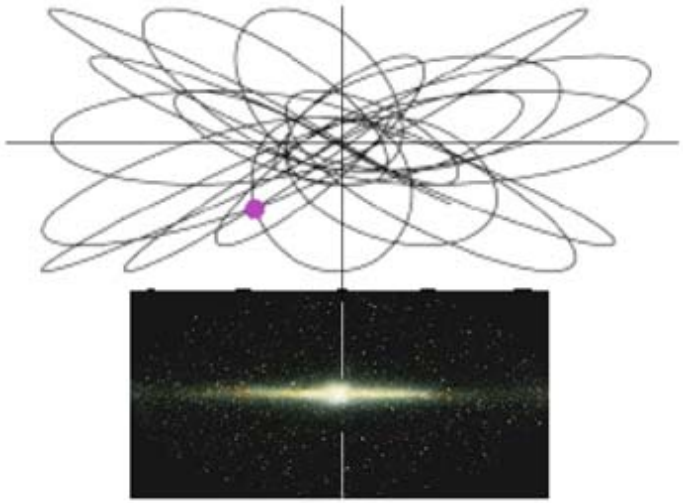
Sloan Digital Sky Survey (SDSS)

MW Dwarfs pre-2005

MW Dwarfs post-2005

The Yale/ODI Survey: Astrometry

- Group Leader: Bill van Altena, Terry Girard
- Proper motions (with existing 1st epoch, or as 1st epoch for future work)
    - Galactic streams (Sgr, Mon)
    - Main Milky Way components (thin disk, thick disk, halo)
    - Specific targets (dwarf galaxies, clusters)
- Parallax
    - Volume sampled scales as cube of parallax precision
    - Parallax accuracy should be +/- 0.6 mas for a star I<22
    - Stellar density within 150 pc to 1.5%
    - Key input into determinations of Dark Matter in solar neighborhood



Freeman 2007, Dinescu et al. 1999

The Yale/ODI Survey: Management Structure

- PI (Charles Bailyn) in charge of overall survey activities and policies
- Project Scientist (Terry Girard) day-to-day survey operations and coordination with Tucson-based WIYN and queue staff
- Science Council: PI, PS and Area Leaders – approve survey projects and participants
- Area Leaders – coordinate projects within a given science domain, and convey needs/concerns to PI, PS and operations team
    - Extragalactic science (N. Padmanabhan & P. van Dokkum)
    - Lensing science (I. Dell'Antonio)
    - Galactic science (M. Geha)
    - Time domain photometry (C. Bailyn)
    - Astrometry (W. van Altena, T. Girard)
    - H alpha? Solar System?
- Projects leaders – coordinate and execute specific science projects

The Yale/ODI Survey: Kinds of programs

- Primary science projects
  Use data from the survey itself. Can be led by community members, must be approved by SC
- Programs for poor conditions
  Bottom quartile seeing and/or significant extinction
- Survey extensions
  Additional time acquired from any of WIYN partners to extend the survey (deeper, wider, longer, different cadence etc). Data considered part of the survey, science projects organized similarly to primary science projects
- Survey “add-ons”
  Stand-alone projects allocated time by any of the WIYN partners, executed as part of the survey queue, PI retains data rights

The Yale/ODI Survey: Goals of this Meeting

- Obtain input for observing strategy
- Begin forming science teams (all catagories of observing projects)
- Identify promising extensions, add-ons and poor conditions programs
- Explore operational issues (data handling and queue operations)

The Yale/ODI Survey: Plan for the Meeting

- Introduction and status of ODI and the survey
- Science area talks, highlighting opportunities and unresolved questions
- Related efforts elsewhere
- Breakout sessions
- Contributed talks
- Continue breakout sessions
- Breakout reports and discussion

The Yale/ODI Survey: Breakout Sessions

- Late today + late morning tomorrow
  - Extra-galactic (Nikhil Padmanabhan)
  - Galactic (Marla Geha)
  - Time Domain – variability, astrometry, solar system (Terry Girard)
  - Data handling – Friday only – (Pierre Martin)
  - Halpha projects – Saturday only – (Jeff Kenney)

- Goals
  - List of uses of primary survey data
  - **ONE** modification to the current strawman plan, with justification
  - list of survey extensions and add-ons (ideally prioritized)
  - uses for non-optimum observing conditions

The Yale/ODI Survey: Strawman Observing Strategy

- **Available Observing Time**
  150 nights (fixed!!) = 750 hours top 3 quartiles of conditions + 250 hours of bottom quartile conditions
- **Fields and Depth**
  3 fields of 12 sq degrees each, RA = ~2, ~8, ~14
  7 hours top quartile observing + 14 hrs median observing per field
  Precise location TBD
- **Filters**
  griz or ugriz, approximately equal exposure time
  most i-band imaging in top quartile observing (0.4” deep images)
- **Cadence**
  2 minute exposures, at least 3/filter/visit (often more)
  ~30 visits per field, 26 in one year, 2 each in other years
  Logarithmic time spacing during intense year

The Yale/ODI Survey: Post-Meeting Activities

- Fix observing strategy
- Organize science teams (expression of interest forms)
- Plan for extensions, add-ons and poor seeing programs
- Continue work on operations (data handling, queue observing)