IASF Milano

formerly Ifctr

INAF ISTITUTO NAZIONALE DI ASTROFISICA

VVDS

z-COSMOS 4t7000 VLT redshifts for COSMOS

PANDORA

CosmoSurveys and AstroSoftware

Overview of group activities

DART

VVDS-SINFONI DB

VObs.it

VIPGI

SPACE

The XMM-NEWTON Large Scale Structure Survey
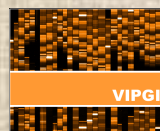
SCIENTIFIC GOAL

- *From the primordial uniform broth, to the current multifarious Universe. HOW?*
- *We know the physical mechanisms (?), what is the sequence of the events? What are the time scales?*
- *Follow observational characteristics through cosmic time.*
  - *Track evolution versus Environment, Luminosity, galaxy Type.*
  - *Have statistically significant numbers per characteristic and redshift bin….*
  - *Big numbers are needed (hundreds of thousands objects)*

  ## *Cosmological Surveys*

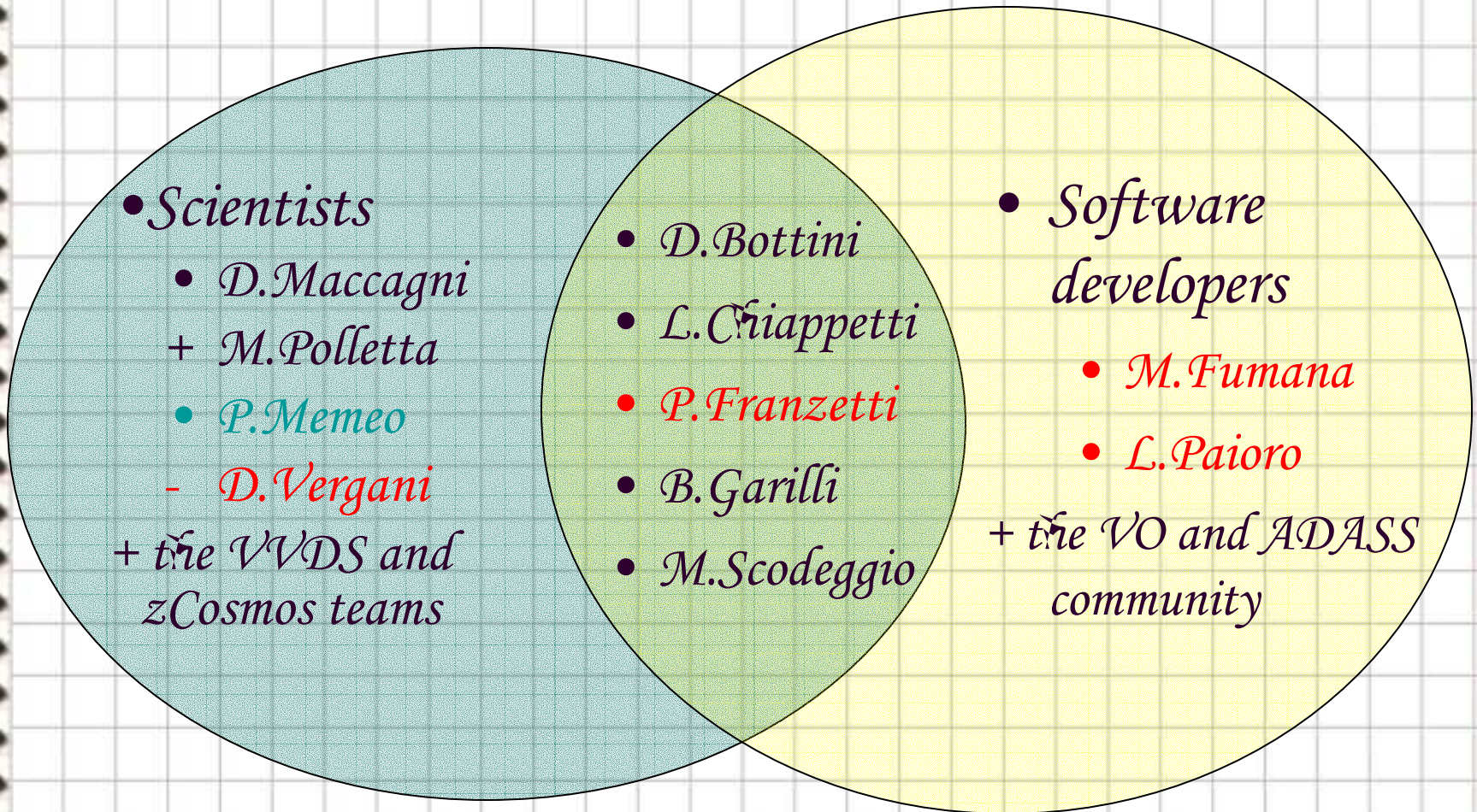- *Now possible, thanks to larger telescopes, more powerful instruments*

TECHNOLOGICAL GOAL

- *Hundreds of thousands of objects*
- *Impossible manual object by object approach*
- *Reduction pipelines, analysis tools, databases are needed.*

Astronomical Software

- *Marriage between Cosmological Surveys and Astronomical Software is natural*

THE GROUP

- Scientists
  - D.Maccagni
  + M.Polletta
  - P.Memeo
  - D.Vergani
+ the VVDS and zCosmos teams

- D.Bottini
- L.Chiappetti
- P.Franzetti
- B.Garilli
- M.Scodeggio

- Software developers
  - M.Fumana
  - L.Paioro
+ the VO and ADASS community

Red: postDocs   Blue: PhD student

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THE MAIN INTERESTS/ACTIVITIES

- **VVDS**
  - UltraDeep
  - Dynamics
  - Mass Assembly
  - Large Scale Structure
  - Star Formation History
  - DB quality control

- **XMM-LSS**
  - DataBase
  - Optical cross-identification
  - AGN SED fitting

- **zCosmos**
  - Mass Assembly
  - Large Scale Structure
  - Transition Objects
  - Dynamics
  - E+A galaxies

- **Software**
  - Data reduction (vipgi)
  - Redshift measurement (EZ)
  - SED fitting (gossip)
  - DataBase access (dart)
  - Virtual Observatory
  - FutureAstronomicalS/wEnvironment

- **Miscellanea**
  - SPACE
  - ALFALFA
  - Virgo cluster
  - Dust absorption

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HIGHLIGHTS ON RESULTS

- *Very recent (< 3 months)*

- *Work in progress*

- *IASF-MI centered*

1. *Software: EZ redshift measurement*

2. *zCosmos: morphology of Star Burst galaxies*

3. *VVDS: mass vs. Environment*

4. *VVDS-Wide: cosmic variance*

NEW EZ DEVELOPMENTS

EZ (Easy Redshifts): Tool to AUTOMATICALLY measure redshifts from 1D spectra. World wide available since 1 year

Benchmark on 10000 spectra (2005)

- *Ran EZ TOTALLY blindly*
- *compared with "manually obtained" redshifts (assumed to be true)*

Success rate: GLOBAL 75%

>90% Secure 92.5%

Redshift reliability: automatically assigns a "reliability" flag to each redshift

Benchmark on 22500 spectra

NOT A MATTER OF "CHANGING THRESHOLD" NEED MORE WORK

EZ flag	Aim	Result
HIGH	95%	96%
Medium	75%	71%
LOW	50%	34%

Fumana + Pandora team

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ZCOSMOS. POSTSTARBURST GALAXIES

- **H$_\delta$S** *galaxies have recently undergone some star forming episode*
  - *Hdelta absorption traces recent (less than 2 Gyr) star formation.*
- **PSB** *galaxies have suddenly stopped forming stars (no [OII] emission).*
- **PSB** *and* **H$_\delta$S** *to constrain the star formation history of galaxies*
  - *how it is activated and why it stops.*
- *Gemini deep deep: 26* **H$_\delta$S** *and 1-2* **PSB** *galaxies.*
- *zCosmos: 650* **H$_\delta$S** *and 50* **PSB** $(0.5<z<1.0$ and $M_B \leq -20$)

- **PSB** *galaxies:*
  - *massive objects (nearly as early-type galaxies)*
  - *large 4000 Balmer break and mostly red colours*
  - *fitted with a population of young (1Gyr) plus old (13Gyr) stars*
  - *More numerous at lower z*
  - *No clear dependence of galaxy density on environment*

Vergani + zCosmos team

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Morphological classification from ACS images for 2783 galaxies

446 $H_\delta S$ and 27 PSB
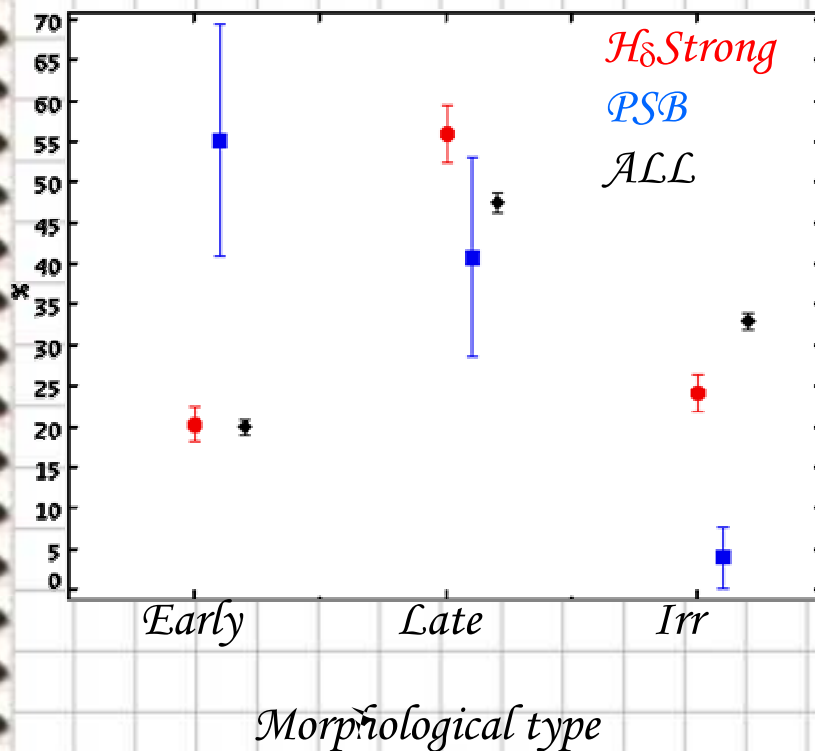
- *occurrence of early-type, late-type and irregular galaxies in the $H_\delta S$ galaxies mimics the one of the entire sample*
- *PSB show an opposite behavior with a larger fraction of objects classified as early-type*

mechanisms which stopped the SF act on the morphology too, on short time scale

$H_\delta Strong$
PSB
ALL

Early   Late   Irr

Morphological type

VVDS: ENVIRONMENT, MASS SEGREGATION, AND GALAXY PROPERTIES

- *Galaxy properties depend on mass*
  - *More massive galaxies are redder*
- *Galaxy properties depend on environment*
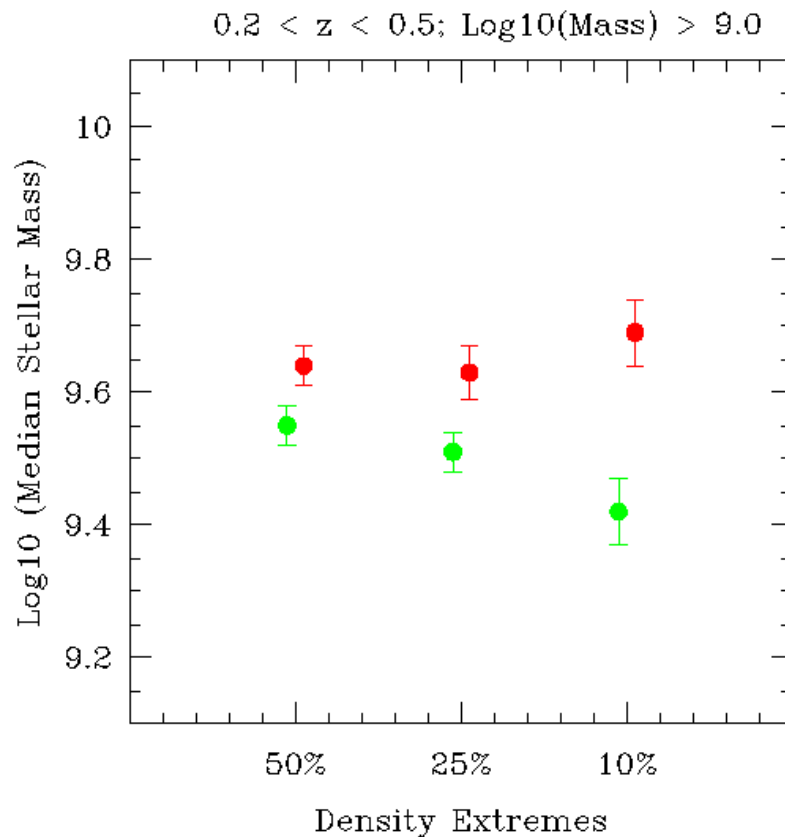 - *Galaxies in densest environments are redder*

What is the driving parameter?

Divide galaxies according to their environmental density, look at their mass distribution
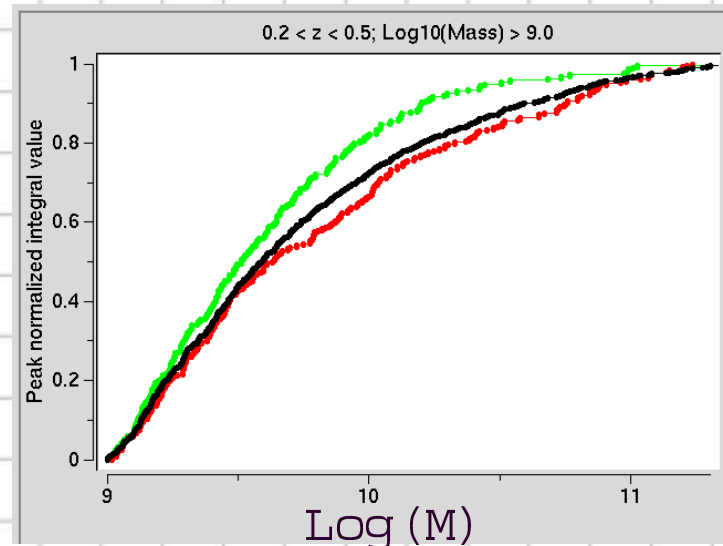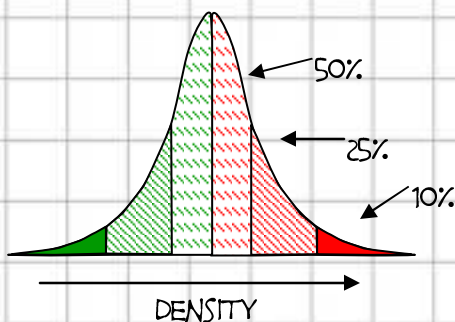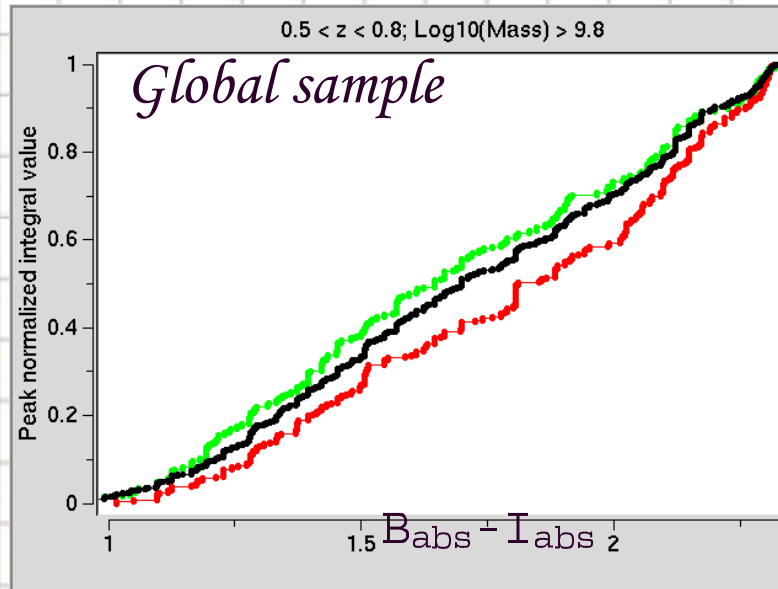

Scodeggio + VVDS team

ENVIRONMENT, MASS SEGREGATION, AND GALAXY PROPERTIES

0.2 < z < 0.5; Log10(Mass) > 9.0
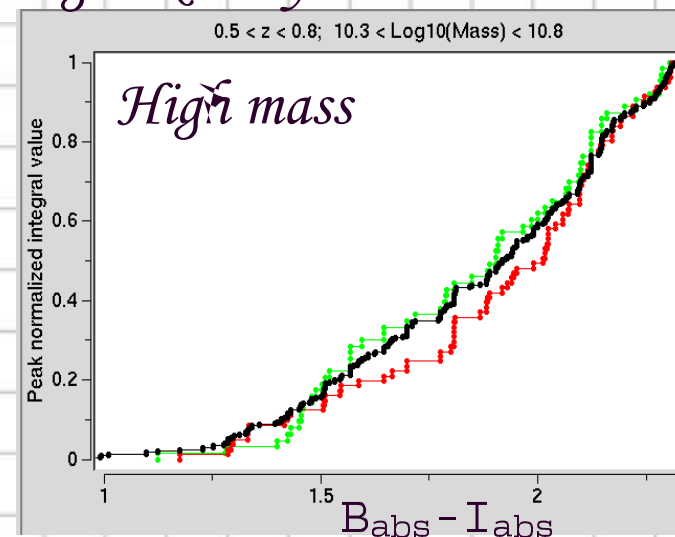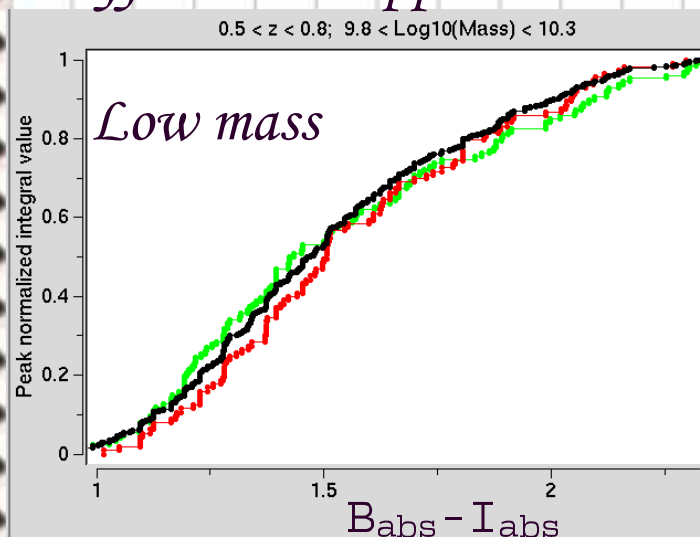

Galaxies in denser environments are more massive

Median galaxy mass per density range

Scodeggio + VVDS team
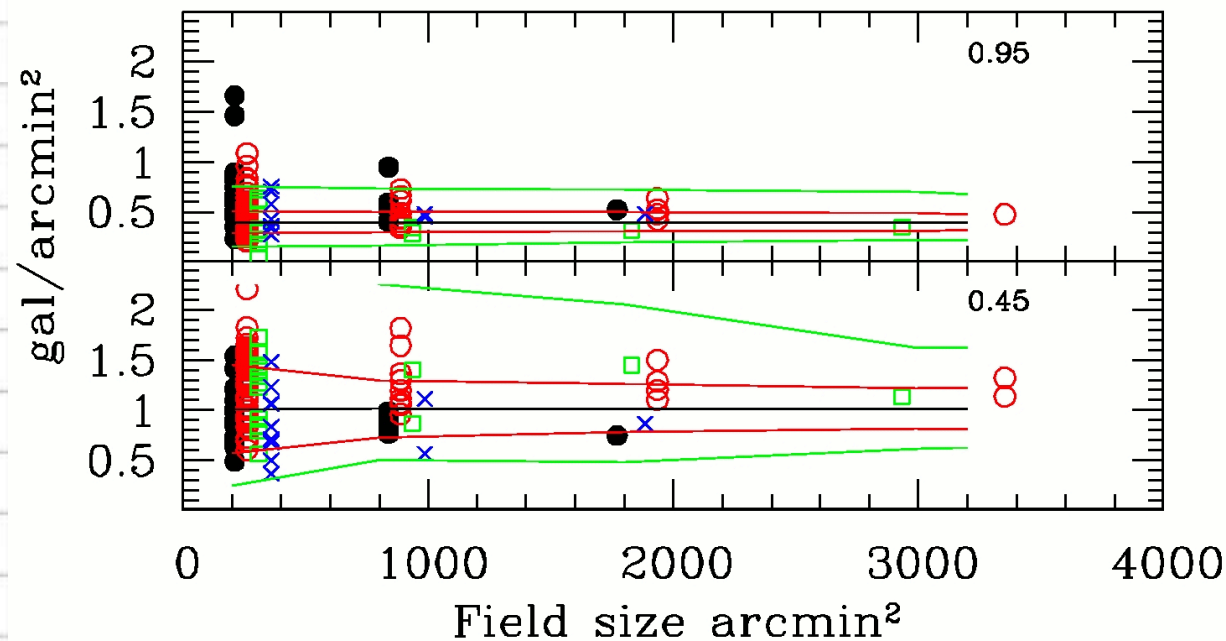
Global sample

Different color distribution according to environment

Difference disappears once we divide galaxies by mass

Low mass

High mass

Environment affects Mass, mass affects the other properties

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COSMIC VARIANCE

- *VVDS Wide survey: 4 fields widely separated on sky*
- *~50000 spectra (first 30000 released... now)*
- *Cosmic Variance*

Garilli + VVDS team

A LOOK IN THE FUTURE

- *Current projects will keep us busy for a few years to come (VVDS follow-ups, zCosmos, VO, Fase)*

- *In the longer term:*
  - *SPACE?*
  - *ELT survey instrument?*
  - *…………………………..?*

PROBLEMS

- *Clear perspective for PostDocs (hiring plan)*

- *More PhD students*

- *Clear and reliable financing process*