

AVO SWG: cosmology

- Geometry, LSS and early universe:
 - Angular and luminosity distances: SNIa, cosmic shear, CMB
 - power spectrum: amplitude, spectral index, running spectral index, growth rate: clustering of galaxies (z survey), cosmic shear
 - topology: CMB anisotropy
- Extragalactic medium and history of building blocks:
 - re-ionisation: survey of high-z QSOs , CMB
 - LSS and super clusters of galaxies: M/L; early vs late type contribution to mass and light, biasing linearity, stochasticity
 - Clusters of galaxies: coupling X-ray, SZ, WL, redshifts: number density as function of redshift, mass function, mass profile
 - Star formation and chemical history
 - Morphological type formation history
- Fundamental physics:
 - Large scale gravity: weak lensing
 - Time variation of fundamental constant: QSOs
 - Dark energy (topic 1): SNIa, cosmic shear, CMB

Possible SRMs

- cosmic shear (to measure w)
- build-up of black holes
 - high- z QSOs
- galaxy clusters
 - O_M , dark matter, LSS, power spectrum, SZ, correlation with CMB (ISW)
 - detection through multi-spectral comparisons
 - morphology-density relation
- look for rare objects
 - SEDs, search multi-dimensional parameter space

Possible SRMs (cont.)

- look for objects with parameters not fitting the known
 - SEDs, search multi-dimensional parameter space
- build-up of stellar mass with cosmic time
 - multi-wavelength, multiple surveys, modelling
- chemical evolution over cosmic time
 - star light, QSO absorption
- correlation of CMB, radio and optical/NIR galaxy surveys
- DM-haloes
 - galaxy-galaxy lensing
- epoch of re-ionisation

Weak shear

- cosmological parameters (especially Ω_7 and w)
- determine LSS
 - need large area
 - photometric redshifts
 - image quality
- COSMOS, CFHT-LS, JDEM/SNAP
- Yannick Mellier knows all about this ...

Build-up of black holes

- census of black holes as a function of z
 - QSO 1 and QSO 2 (Padovani)
 - correlating radio, X-ray and optical/NIR point sources
 - need field of view
 - GOODS only good for $z > 3$
 - photometric redshifts
 - SED “identifications”
 - high- z QSOs (McMahon)
 1. sky area, Lyman-break (“SED”)
 2. XMM serendipitous survey and FIRST/SUMSS

Galaxy clusters

- O_M , s_8 , dark matter, LSS, power spectrum, SZ, correlation with CMB (ISW)
(Maccacaro, Hopp, Cimatti, Voges, Rosati)
 - detection through multi-spectral comparisons
 - red sequence in optical/NIR
 - diffuse X-rays
 - galaxy clustering
 - SZ signal
 - lensing signal
 - (add spectral search)
 - Large-scale galaxy evolution (Valentijn)
 - morphology-density relation
 - sites of morphological transitions
 - automatic morphological classification
 - statistics: identification of LSS and outside

Rare or unknown objects

(Leahy, Valentijn, Leibundgut)

- search multi-dimensional parameter space
 - time-variability
 - SEDs, ‘two-colour’ diagrams
 - beware of false-positives (uncertainties!)

Build-up of stellar mass with cosmic time

- SEDs (Cimatti)
 - optical, NIR (UKIDSS/VISTA), infrared (Spitzer-SWIRE/GOODS)
 - fitting to population synthesis models (e.g. GISSEL)
- Gas masses (?)
 - HI
 - DLAs and IGM

Chemical evolution over cosmic time

- star light (Cimatti, De Young)
 - massive spectroscopy surveys (e.g. VIMOS, GALEX, SDSS, 2dF, CIRPASS, FMOS, KMOS)

Correlation of CMB, radio/mm and optical/NIR galaxy surveys

(Banday, Leahy, da Costa)

- ‘all sky’ surveys
- Sunyaev-Zeldovich clusters (AMI, AMOEBA, Planck)
- integrated Sachs-Wolfe effect (WMAP, Planck)
- gravitational lensing of CMB polarisation (BICEP, CLOVER, etc.)

Dark matter haloes

- galaxy-galaxy lensing (Quinn)
 - deep imaging surveys (SDSS, VST, GEMS, COSMOS)
 - stacking of galaxy images and measuring galaxy shapes (similar to weak shear → Mellier)
 - (galaxy case? – tidal streams, dwarf companions/satellites, background galaxies)

Epoch of re-ionisation

- cross-correlate HI holes (LOFAR) with Lyman-break objects
(Valentijn, Cimatti, Hopp)
 - redshift known from LOFAR observations
- find high- z quasars (McMahon)
 - see build-up of black holes