OTELO: The Stellar Component of the Groth Field

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OTELO, the key OSIRIS science project, is a deep emission line object survey to be performed with the OSIRIS Tunable Filters, in selected atmospheric windows relatively free of sky emission lines. The observing strategy will allow studying a clearly defined volume of the Universe at a known flux limit. The total survey sky area is about 1 square degree, distributed in different low extinction fields with adequate angular separations. The survey will result in 3D data cubes covering 150-180 Å wavelength intervals at spectral resolution of ~700, from which spectra of the different sources will be retrieved. OTELO is not only unbiased, but its 5σ depth of 1x10^{-18} erg/cm²/s will make OTELO the deepest emission line survey to date.

BROAD BAND SURVEY
An auxiliary broad band survey has been undertaken in order to provide:
- Morphological identification
- Photometric redshift
- Environment of the sources
- Percentage of emission line targets
- Approximate population synthesis

REDUCTION AND EXTRACTION OF SOURCES
Reduction sets followed standard steps using IRAF packages. Absolute astrometry: the USNO B1 catalogue was used.
- An automatic 2D (Béjar & Anwandt 1999) have been used to extract sources. A solution derived mask of
- Optical (seeing disk) and a detection threshold of 1.4 sigma were adopted.
- In order to match the catalogs, we took 1" as the largest distance for identification of objects in two catalogs.

PHOTOMETRIC CALIBRATION
- Selection of calibration stars:
  - Objects with stellarity > 0.9 (SExtractor parameter)
  - Common stars in all frames in each filter
  - Instrumental magnitude > 17 (linearity range)

In each frame, fit transformation equations:

\[
\begin{align*}
B &= B_{SDSS} - (a_1 + a_2 (B_{SDSS} - V_{SDSS})) \\
V &= V_{SDSS} - (a_1 + a_2 (B_{SDSS} - V_{SDSS})) \\
I &= I_{SDSS} - (a_1 + a_2 (B_{SDSS} - V_{SDSS}))
\end{align*}
\]

- Images with very different transformation coefficients are rejected
- Combination of all good frames in each filter
- New fit for combined images in each pointing
- Comparison between the three pointings
- Determination of final average zero point

CATALOGUE OF STARS
Final catalogue has ~ 45000 objects
Selection of stars (in order to compare with Besançon models):
- Objects detected in all filters
- Stellarity > 0.9 in all filters
- ~ 850 survival stars, 2% of total sources.
- Test for the goodness of the stellarity parameter to separate stars of galaxies.

Simulation of point sources in science images
Separation through SExtractor separation
- For B and V filters, between 19 and 24.5 magnitude only 1% of the point sources are misclassified.
- For B and I filters significant differences are over 23.

BESANÇON MODELS
The Besançon models (Robin et al 2003) are based on a population synthesis scheme. It includes:
- 4. The extinction is modeled by a diffuse thin disc.
- 3. Density laws for the thin disc are constrained self-consistently by the potential via the Boltzmann equation and are age dependent.
- Each population is described by a SFR history, an IMF, an age or age-range, a set of evolutionary tracks, kinematics, metallicity characteristics, and includes a part of the white dwarf population.
- 2. Each population is determined to an age, age-range, a set of evolutionary tracks, kinematics, metallicity characteristics, and includes a part of the white dwarf population.
- 1. Four distinct populations: a thin disk, a thick disk, a bulge and a spheroid.

The resulting model can be used for simulations of the galactic stellar populations in any directions in photometric bands UBVRIJHKL.

LIMITING MAGNITUDES
Simulations of artificial point sources in background real images in random coordinates in order to estimate limiting magnitudes.

Limiting magnitudes (at 50% detection efficiency) are: 26. (B band); 26. (V band); 26. (R band) and 26. (I band)

REFERENCES


http://www.eso.org