

# CURRICULUM VITAE

## Valentina Viotto

### PERSONAL INFORMATIONS

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Nationality	Italian
Birth date	11-06-1983
Signature	.....

### STUDIES

#### SPECIALIZED DEGREE IN ASTRONOMY

- |                                 |  |
|---------------------------------|--|
| • Dates (from– to)              | October, 2005– December 2007   |
| • Institute                     | Università degli studi di Padova– Italy  |
| • Supervisor and Co-supervisors | Ch.mo Prof. F. Bertola<br>Dott. J. Farinato, Ch.mo Prof. R. Ragazzoni, Dott. E. M. Corsini   |
| • Title of the degree thesis    | “Interferometria di Fizeau con LBT di galassie della Vergine: caratterizzazione dei sensori di fronte d’onda a 12 stelle”<br>(Translation: Fizeau interferometry with LBT of galaxies of the Virgo cluster: characterization of the 12-star wavefront sensors) |
| • Final grade                   | 110/110 e lode   |

#### Degree thesis description<sup>1</sup>:

My degree thesis was about the characterization of some fundamental components of the Ground layer Wavefront Sensor (GWS) of Nirvana (*Near-InfraRed/Visible Adaptive iNterferometer for Astronomy*), the MultiConjugated Adaptive Optics system, equipped with layer-oriented pyramid wavefront sensors, that will be used by the Large Binocular Telescope, in its interferometric configuration.

Such a sensor will allow to select up to 12 natural guide star to retrieve the deformations introduced on the wavefronts by the lower part of atmosphere.

The project involves a consortium of both Italian and German institutes.

In the framework of this project, I personally made some comparative tests on the performances of two different prototypes of the same mechanical component at low temperatures, so as to make a choice between two different suppliers<sup>2</sup>; these tests have been performed c/o the Max Planck Institute für Astronomie in Heidelberg.

Moreover, I performed other laboratory tests, c/o the Osservatorio Astronomico di Padova, in order to verify the optical performances of 30 refractive pyramids and to select two sets of 12 pyramids to be mounted inside the two GWSs (one for each arm of LBT)<sup>3</sup>.

Finally, I presented one possible application of Nirvana to the study of the central regions of galaxies in the Virgo cluster, with particular care to the acquisition of hi-resolution surface brightness profiles at infrared wavelengths, so as to obtain, combining the future LBT datasets with the ones already taken by HST in the visible, colour-colour diagrams which could allow a characterization of the stellar populations in terms of age and metallicity.

<sup>1</sup> See the attached Tesi di Laurea

<sup>2</sup> See the attached document “*Pitch and roll measurements at different temperatures for the GWS prototype stages*”

<sup>3</sup> See the attached document “*Beam divergence measurements of 30 refractive pyramids for Nirvana GWS*”

### THREE-YEAR DEGREE IN ASTRONOMY

- Dates (from– to)      October, 2002– October, 2005
  - Institute      Università degli studi di Padova – Italy
- Supervisor and Co-supervisor      Ch.mo Prof. F. Bertola  
Dott. E.M.Corsini
- Title of the degree thesis      “Applicazione di un metodo di decomposizione fotometrica bidimensionale per lo studio delle proprietà strutturali di un campione di galassie a spirale” (Translation: application of a bidimensional photometric decomposition method to the study of the structural properties of a spiral galaxies sample)
- Final grade      110/110e lode

#### **Degree thesis description**

The work consisted in the analysis of the surface brightness distribution of a sample of 16 disk galaxies, members of the Fornax and Pegasus clusters. Such galaxies were selected in the framework of a bigger project, whose aim was to study the photometric, cinematic, dynamic properties and the star populations of the spheroids of lenticular and spiral galaxies.

The structural parameters of both the spheroid and the disc of the galaxies of the sample were obtained applying a bidimensional photometric decomposition method to CCD images taken in R-band with a 3.6-meters telescope of the *Southern Observatory*. The obtained data lend to different applications useful to understand the structure and to explain the galaxies formation methods.

In the framework of the link between the structural parameters of the spheroids and the properties of their stellar populations, it was possible to verify (just for some of the spiral galaxies of the sample) the correlation between the shape parameter and the metallicity of the spheroid, recently discovered for the elliptical galaxies and the spheroids of the lenticular galaxies.

### SCIENTIFIC SECONDARY SCHOOL

- Dates (from– to)      September, 1997– June, 2002
  - Institute      Liceo scientifico statale G. Berto– Mogliano Veneto, Tv – Italy
- Final grade      100/100

### **PERSONAL KNOWLEDGES**

**NATIVE LANGUAGE**      **ITALIAN**

**LANGUAGE KNOWLEDGE**

**ENGLISH**      FAIR COMMAND WITH SPOKEN AND WRITTEN LANGUAGE

**COMPUTER KNOWLEDGE**

**OPERATING SYSTEMS**      WINDOWS AND LINUX

**PROGRAMMING LANGUAGES**      FORTRAN: school knowledge

MATLAB: school knowledge

C++: school knowledge

SUPERMONGO: school knowledge

IDL: certified attendance to an introducing course, language used for the reduction of laboratory data

**ASTRONOMICAL SOFTWARE**      IRAF: used for photometric data reduction

DAOPHOT: school knowledge

## WORK EXPERIENCES

### Osservatorio Astronomico di Padova– Adaptive Optics Group

Professional training (06/07– 08/07)

Contract for “collaborazione coordinata e continuativa”(05/08– today)

Ph.D. in Astronomy (01/09– today)

- PROJECTS**
- LINC-NIRVANA: (*Near InfraRed and Visibile Adaptive iNterferometry for Astronomy*) it's a multi-conjugated layer-oriented adaptive optics system to be mounted at the Large Binocular Telescope (LBT), involving a consortium of institutes, including INAF, the Max-Planck-Institut für Astronomie (MPIA) in Heidelberg, the Physikalische Institut of Colonia University and the Max-Planck-Institut für Radio-astronomie (MPIfR) in Bonn. The instrument is equipped with two Adaptive Optics modules (one for each arm of LBT), each composed by two pyramid wavefront sensors for MultiConjugate Adaptive Optics (MCAO), conjugated to different heights, so as to correct perturbations introduced by the atmosphere on the incoming wavefronts and to interferometrically combine the beams coming from the two LBT arms, in order to achieve diffraction-limited images with a resolution comparable with the one of a 24-meters-diameter telescope. I'm personally involved into the assembly, integration and testing of the Ground-layer Wavefront Sensors, to be used to reconstruct the distortion introduced on the wavefronts by the lower part of the atmosphere. This work is on going at the Osservatorio Astronomico di Padova. Later, I will actively participate to the integration of these systems on the Nirvana optical bench at the MPIA in Heidelberg.
  - TOE: (*The Onduline Experiment*) it is an instrument that will be dedicated to the study of the atmospheric properties of some astronomical sites on large spatial scales (~40 meters), in order to characterize the atmospheric parameters of the higher turbulent layers, in the framework of the selection of a site for the future Extremely Large Telescopes. The instrument is based on a new wavefront sensor concept, whose heart consists in an optical window with sinusoidal transmission. TOE has been conceived to be mounted on one of the Unit Telescope of the Very Large Telescope (VLT), but in order to be eventually easily adapted to other telescopes, so as to test several astronomical sites. In the framework of thi project, I actively participate to the writing of the instrument *final design review* and to the first *test and software developing* phase in C language, on a camera ordered just with this aim.
  - FIRB-WATERFALL: it is a project in the framework of the collaboration between SIFI, a pharmaceutical company working in the EyeCare sector, and INAF; that collaboration points at the application of adaptive optics techniques to ophthalmology. The project is divided into several phases of new sensors ideation and testing. In particular, I personally realized a laboratory prototype of pyramid wavefront sensor to measure the shape of intraocular lenses to be used to replace the crystalline inside the human eye, with a view to a possible use to perform quality tests during the production of these intraocular lenses.
  - PLATO: it is a space project, consisting in the putting in orbit a satellite, equipped with a system of 28 telescopes all looking at the same 25 degrees in diameter field. This instrument will be mainly used to search extrasolar planets using the transit method. The project is still in its phase A. An answer to the call for the feasibility study of the PLATO mission has recently been sent to the Italian Space Agency (ASI). This proposal involves research personnel from several Italian institutes. I personally am involved into the WP concerning the optomechanical design of the instrument.

## LABORATORY EXPERIENCES

During the last year of my university studies, I made a two months professional training c/o the adaptive optics laboratory of the Osservatorio Astronomico of Padova, where I then performed the tests described in my degree thesis.

During the thesis period, I also used the laboratory instrumentation of Max Planck Institute für Astronomie of Heidelberg, in order to perform some tests on mechanical components.

After these experiences, I gained and applied some knowledge about the optical bench setting up, the laboratory data acquisition and their consequent elaboration in IDL language.

## WRITING OF DOCUMENTATION

In order to document these lab activity I wrote some reports, collecting setup descriptions and alignment procedures, as well as the obtained results (see attachments).

Moreover, I actively participated to the writing of the Final Design Review of TOE (*The Onduline Experiment*), a wavefront sensor to be mounted at the Very Large Telescope, in order to study important atmospheric parameters.

Finally, I contributed to write the report about the activities done and on going at the Osservatorio Astronomico di Padova in the framework of the collaboration INAF-SIFI about the project FIRB-WATERFALL.

## INTERNATIONAL MEETINGS

1. LINC-NIRVANA CONSORTIUM MEETING, April 2007, Padova (Italy)
2. LINC-NIRVANA CONSORTIUM MEETING, July 2007, Heidelberg (Germany)
3. LINC-NIRVANA CONSORTIUM MEETING, May 2009, Roma (Italy)
4. LINC-NIRVANA CONSORTIUM MEETING, October 2009, Heidelberg (Germany)
5. LINC-NIRVANA CONSORTIUM MEETING, March 2010, Cologne (Germany)
6. PLATO PLENARY MEETING, May 2009, Roma (Italy)
7. PLATO TOU & SYSTEM TEAMS MEETING, February 2010, Padova (Italy)
8. PLATO TOU & SYSTEM TEAMS MEETING, March 2010, Bern (Switzerland)

## PUBLICATIONS

### CONFERENCES

1. Farinato, J., Ragazzoni, R., Arcidiacono, C., Gentile, G., Brunelli, A., **Viotto, V.**, Diolaiti, E., Foppiani, I., Lombini, M., Schreiber, L., Bizenberger, P., de Bonis, F., Egner, S., Gaessler, W., Herbst, T. M., Kuerster, M., Mohr, L., Rohloff, R.-R., "*The multiple field-of-view layer-oriented wavefront sensing system of LINC-NIRVANA: two arcminutes of corrected field using solely natural guide stars*", 2008, in SPIE Proc., 7015, 202
2. Metti, C., Ragazzoni, R., Arcidiacono, C., Baruffolo, A., Dima, M., Diolaiti, E., Farinato, J., Gentile, G., **Viotto, V.**, "*TOE, the Onduline experiment: a new kind of wavefront sensor to characterize astronomical sites for extremely large telescopes*", 2008, in SPIE Proc., 7012, 163
3. Arcidiacono, C.; Ragazzoni, R.; Farinato, J.; Gentile, G.; Baruffolo, A.; Dima, M.; Metti, C.; **Viotto, V.**; Diolaiti, E. "*Retrieving High Layer Atmospheric Turbulence Statistics on E-ELT Scales*", 2009, OPTICAL TURBULENCE: Astronomy Meets Meteorology, Proceedings of the Optical Turbulence Characterization for Astronomical Applications Sardinia, pp.128-135
4. Ragazzoni, R.; Arcidiacono, C.; Dima, M.; Dri, P.; Farinato, J.; Gentile, G.; Magrin, D.; **Viotto, V.** "*How to break the FoV versus thickness rule in MCAO*", 1st AO4ELT Conference - Adaptive Optics for Extremely Large Telescopes proceedings, 02003, 2010

## TECHNICAL REPORTS

5. Brunelli, A., **Viotto, V.**, De Bonis, F., Egner, S., Kittmann, F., *"Pitch and roll measurements at different temperatures for the GWS prototype stages"*, 2007, LINC-NIRVANA Team Documents, LN-INAFP-TN-AIT-002
6. **Viotto, V.**, *"Beam divergence measurements of 30 refractive pyramids for Nirvana GWS"*, 2008, LINC-NIRVANA Team Documents, LN-INAFP-TN-AIT-003
7. Farinato, J.; **Viotto, V.**, *"GWS Error Budget"*, 2009, LINC-NIRVANA Team Documents, LN-INAFP-DES-GEN-001
8. Farinato, J.; **Viotto, V.**, *"Requirements on tip-tilt and positioning of the annular folding mirror"*, 2009, LINC-NIRVANA Team Documents, LN-INAFP-REQ-AO-003
9. Basso, S.; Ghigo, M.; Farinato, J.; Magrin, D.; Munari, M.; Piazza, D.; Pagano, I.; Ragazzoni, R.; Scuderi, S.; Arcidiacono, C.; Canestrari, R.; Dima, M.; Gambicorti, L.; Gentile, G.; Pace, E.; Spanò, P.; **Viotto, V.**, 2009, *"ASSESSMENT PHASE - PPLC FINAL DESIGN REPORT - APPENDIX D - TELESCOPE OPTICAL UNITS"*, PLATO Team Documents, PLATO.INAF.TOU.REP.1045
10. Farinato, J.; Gentile, G.; **Viotto, V.**, *"Pupil Re-Imager alignment procedure"*, 2010, LINC-NIRVANA Team Documents, LN-INAFP-TN-AIT-003

## DESIGN REVIEW

11. Ragazzoni, R., Arcidiacono, C., Diolaiti, E., Gentile, G., Baruffolo, A., Dima, M., Metti, C., **Viotto, V.**, *"A Conceptual Design Study of a Wavefront Sensor for Atmospheric Characterisation of Paranal site"*, 2008