

Bachar Wehbe



Title

Atmospheric Dispersion Corrector: From design phase to on-sky commissioning

Abstract

Astronomical observations with ground-based telescopes are affected by differential atmospheric dispersion, a consequence of the wavelength-dependent index of refraction of the atmosphere. In high resolution astronomical instruments, an Atmospheric Dispersion Corrector (ADC) is mandatory to avoid wavelength dependent losses. Even though an ADC seems a simple component, but from the design phase to on-sky commissioning, several problems can occur. The design of an ADC is based on atmospheric models that, to the best of our knowledge, were never tested on-sky. Different models shows a variation of 50 milli-arcseconds (mas), a value close to the required residuals from current ADCs. During the commissioning, detecting a variation of 50 mas in a PSF of 1 arcseconds, is not an easy task. We will present a method to measure on-sky the atmospheric dispersion based on measuring the PSF centroid of each wavelength using cross-dispersed spectra. We are able to characterize different atmospheric models with an accuracy of 18 mas. As for the on-sky commissioning, we present a simple concept based on the ellipse fit of intensity contour plots of the PSF. This method will allow us to better align the ADC in terms of prisms angles and total dispersion direction using on-sky measurements. In this talk we show the study we did to improve the phases of an ADC from design to on-sky commissioning.

Bachar Wehbe

Curriculum Vitae

PERSONAL DETAILS

Birth December 3, 1989
Address Avenida da França, 358, H2.2, 4050-276, Porto, Portugal
Phone +351 964511251
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EDUCATION

PhD Astrophysics 2016 - Pres.
Faculty of Sciences University of Porto (FCUP)
Institute of Astrophysics and Space Sciences (IA)
Portugal

M.Sc. Astrophysics 2011-2014
Notre Dame University (NDU)
University Saint Joseph (USJ)
Lebanon

B.S. Physics 2007-2011
Lebanese University (LU)
Lebanon

TEACHING EXPERIENCE

Physics Instructor - Lab Instructor 2015-2016
NDU
Lebanon

Physics Teacher 2012-2014
Ecole National Orthodoxe
Lebanon

Physics Teacher 2007-2016
Teaching private lessons for primary and secondary classes
Lebanon

MEETING ORGANIZATION

SOC & LOC

Network of Young Researchers in Instrumentation for Astronomy (NYRIA)

Virtual

Oct. 2020

SOC, LOC, & social interaction

Portuguese Astronomy and Astrophysics Meeting (ENAA)

Virtual

Sept. 2020

Co-Chair SOC & LOC

NYRIA

Lisbon - Portugal

Nov. 2019

LOC

International conference on Applications of Optics and Photonics (AOP)

Lisbon - Portugal

June. 2019

Board

NYRIA

2018 - Pres.

WORK TRIPS

NIRPS ADC test

Second tests of the NIRPS ADC

Geneva - Switzerland

Oct. 2018

NIRPS ADC test

First tests of the NIRPS ADC

Geneva - Switzerland

Mar. 2018

Participant in the 1st East Asian Workshop on Astrostatistics

National Astronomical Observatory of Japan

Tokyo - Japan

Feb-Mar 2017

Telescope Test

Third assembly of the Geisi-NDU telescope and control system

Lebanon

Jan. 2016

Participant in the ICTP workshop on particle physics

Physics Without Frontiers

Lebanon

Apr. 2015

Participant in the IAU MENA Regional Summer School <i>Astronomy with Small Telescopes</i> <i>Lebanon</i>	Aug. 2014
Participant in the Summer school Black Holes at all scales <i>COST Action MP-0905 "Black Holes in a Violent Universe"</i> <i>Greece</i>	Sep. 2013
Telescope Test <i>First assembly test of the Geisi-NDU telescope</i> <i>Japan</i>	Feb. 2013
Participant in the IAU MENA Regional Summer School <i>Spectroscopy in Astrophysics</i> <i>Lebanon</i>	Aug. 2010

TALKS

A novel method for on-sky measurements of atmospheric dispersion <i>ENAA</i> <i>Virtual</i>	Sept. 2020
Atmospheric dispersion correction: Residuals requirements <i>NYRIA</i> <i>Lisbon - Portugal</i>	Nov. 2019
Atmospheric dispersion correction: Residuals requirements <i>ENAA</i> <i>Lisbon - Portugal</i>	Sept. 2019
Atmospheric dispersion correction: Model requirements and impact on radial velocity <i>AOP</i> <i>Lisbon - Portugal</i>	June 2019
Atmospheric dispersion measurements for model validation <i>NYRIA</i> <i>Leiden - The Netherlands</i>	Oct. 2018

PUBLICATIONS

- **Wehbe, B.**, Cabral, A., Ávila, G., A novel method for on-sky measurements of atmospheric dispersion, 2020, Proc. SPIE, 11447-64
- Cabral, A., **Wehbe, B.**, A simple concept for ADC on-sky commissioning tests, 2020, Proc. SPIE, 11447-102
- **Wehbe, B.**, Cabral, A., Sbordone, L., Ávila, G., On-sky measurements of atmospheric dispersion – II. Atmospheric models characterization, 2020, in preparation (for MNRAS)
- **Wehbe, B.**, Cabral, A., Ávila, G., On-sky measurements of atmospheric dispersion - I. Method validation, 2020b, MNRAS, 499, 183
- **Wehbe, B.**, Cabral, A., Martins, J.H.C., et al. The impact of atmospheric dispersion in the performance of high-resolution spectrographs, 2020a, MNRAS, 491, 3515
- **Wehbe, B.**, Cabral, A., Ávila, G., The development of an optical design tool for atmospheric dispersion correction, 2019, Proc. SPIE 11207P
- **Wehbe, B.**, Cabral, A., Figueira, P., et al., Atmospheric dispersion correction: model requirements and impact on radial velocity measurements, 2019, Proc. SPIE 112070U
- Hajjar, R., **Wehbe, B.**, BeePol: an imaging polarimeter for the Farid & Moussa Raphael Observatory, 2017, Journal of Physics: Conference Series, Volume 869, Issue 1, article id. 012083

GRANTS

PhD:SPACE PhD fellowship

Foundation of Science and Technology (FCT)
Portugal (PD/BD/135225/2017)

2017 - Pres.

BeePol:A Lebanese Astronomical Imaging Polarimeter

Center of National Scientific Research
Lebanon (Grant: 01-08-15)

Sep. 2015

SKILLS

<i>Languages</i>	Arabic (mother tongue) English (fluent) French (fluent)
<i>Software</i>	UBUNTU (LINUX), WINDOWS , ZEMAX, PYTHON, L ^A T _E X, IRAF MICROSOFT OFFICE

INTERESTS

Futsal
Swimming
Camping
Reading

All documents are available upon request.