# Felipe de Oliveira Alves - Curriculum Vitae

## 1 Personal Data

Felipe de Oliveira Alves
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## 2 Education

- 2011, Ph.D., Astrophysics (*Doctor Internacional, Cum Laude*)

  *Institut de Ciències de l'Espai* (ICE) / *Universitat de Barcelona* (UB), Barcelona, Spain

- 2004, M.Sc., Astrophysics

  *Universidade Federal de Minas Gerais* (UFMG), Belo Horizonte, Brazil

- 2002, B.Sc., Physics

  *Universidade Federal de Minas Gerais* (UFMG), Belo Horizonte, Brazil

## 3 Professional history

- 2014 – present: postdoctoral researcher
  *Center for Astrochemical Studies, Max-Planck-Institut für extraterrestrische Physik*, Garching, Germany.

- 2011 – 2014: postdoctoral researcher
  *Argelander-Institut für Astronomie der Universität Bonn*, Bonn, Germany.

- **2011 – 2014: support scientist at German ALMA Regional Center (ARC) node (50% duties)**
  *Argelander-Institut für Astronomie der Universität Bonn*, Bonn, Germany.

- 2006 – 2011: doctorate
  Fellowship: *Formación de Personal Investigador* (*Consejo Superior de Investigationes Cientìficas*, CSIC)
  *Institut de Ciències de l'Espai*, Barcelona, Spain

- 2002 – 2004: master
  Fellowship: *Conselho Nacional de Desenvolvimento Cientfíco e Tecnológico* (CNPq)
  *Universidade Federal de Minas Gerais*, Belo Horizonte, Brazil

- 2000 – 2002: research internship
  Fellowship: *Conselho Nacional de Desenvolvimento Cientfíco e Tecnológico*, (CNPq)
  *Universidade Federal de Minas Gerais*, Belo Horizonte, Brazil

- 1998 – 2002: outreach internship
  Fellowship: *Universidade Federal de Minas Gerais*, Belo Horizonte, Brazil

## 4    Observational Experience

- *Millimeter/submillimeter observations*

    Single-dish observations

    Institut de Radio Astronomie Millimétrique (IRAM), 30-m telescope (PI[1] time: 113 hours)

    Atacama Pathfinder Experiment (APEX) (PI time: 60 hours)

    Interferometric observations

    **Atacama Large Millimeter/sub-millimeter Array (ALMA) (PI time: 30 hours)**

    Submillimeter Array (SMA) (PI time: 10 hours)

- *Centimetric observations*

    Single-dish observations

    Green Bank Telescope (GBT/NRAO) (PI time: 114 hours)

    Interferometric observations

    Karl G. Jansky Very Large Array (VLA/NRAO) (PI time: 50 hours)

    Very Long Baseline Array (VLBA/NRAO) (PI time: 15 hours)

- *Near-infrared photo-polarimetric observations*

    4.2m William Herschel Telescope Roque (ING/WHT) (PI time: 2 nights)

    Observatório do Pico dos Dias (LNA/MCT) (PI time: 3 nights)

- *Optical photo-polarimetric observations*

    Observatório do Pico dos Dias (LNA/MCT) (PI time: 80 nights)

## 5    Support Scientist for the German ARC node

- *Quality Assessment of ALMA data*

    Development and testing of data reduction scripts (data reading, calibration and imaging)

    Assessment of final products on quality grounds based on sensitivity and resolution (QA2)

- *Contact Scientist* (CS)

    Connection between ALMA users and the observatory: Helpdesk, face-to-face and e-mail

    Phase I support: proposal preparation and use of Observing Tool

    Phase II support: revision of observing scripts, scheduling blocks and project tracking.

    Support with data reduction (CASA software) and interpretation

- *Organisation of workshops and tutorials on proposal preparation before ALMA proposal deadlines*

- *Specific tasks to improve observing and data reduction strategies*

    - Development of the CASA tool *ChandraFermi*: The task aimed at a quick visualisation of polarization data, including Stokes parameters $I$, $Q$ and $U$, polarization vector field and angle dispersion maps. The task also included a set of geometrical models (e. g., parabolic or hyperbolic) to be chosen by the user to fit the magnetic field maps of collapsing cores.

    - Interferometric observations with the *Submillimeter Array* of SiO molecular line polarization from evolved stars showing bright and stable SiO emission in previous single-dish (APEX) observations. The goal was to create a catalogue of potential calibrators for ALMA spectral line polarization observations.

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[1]Principal Investigator

# 6   Publication metrics (via *ADS*)

- 12 <u>first author</u> publications in *peer-reviewed* journals

    3 publications with press releases and media coverage

- 32 co-author publications in *peer-reviewed* journals

- 54 publications in total (44 publications in the first quartile, Q1)

- Total number of citations: 1034; average of 91 citations/year during postdoctoral period

- H-index: 20

- 1 publication as <u>first author</u> in the *Science Magazine*

- 1 publication as co-author in *Nature Astronomy*

- 1 review chapter to be published in the *Protostar and Planets VII* book series

# 7   Major collaborations

- Seeds of Life in Space (SOLIS): NOEMA large observational program that aims at understanding the formation of complex organic molecules in distinct evolutionary stages of star-formation.

- **Fifty AU Study of the chemistry in the disk/envelope system of Solar-like protostars (FAUST)**: ALMA large program that aims at studying kinematics and chemistry at envelope/disk scales.

- Green Bank Ammonia Survey (GAS): large observational program using the GBT telescope that aims at observing the Ammonia molecular line (NH3) in nearby star-forming regions.

# 8   Seminars as invited scientist

- *The ALMA view of Barnard 59: feeding protostars through accretion streamers* (webinar)
  01/02/2022, Star & Planet Formation Webinar
  European Southern Observatory, Germany

- *Growing stars and planets in the furrows of Barnard 59* (webinar)
  06/04/2021, Dublin Institute for Advanced Studies, Ireland
  03/05/2021, Núcleo de Astrofísica, Universidade Cidade de São Paulo, Brazil

- *The driving mechanisms of protostellar evolution* (webinar)
  05/06/2020, Pizza seminar
  Institut de Ciències de l'Espai, Spain

- *Multi-wavelength polarimetry and kinematics in star-forming regions*
  24/10/2016, Riken, Japan

- *From Planck to ALMA: a multi-scale view of magnetized environments*
  25/03/2016, SMA Science Talk Series
  Harvard-Smithsonian Center for Astrophysics, USA

- *Starlight polarization of star-forming regions*
  25/06/2015, ISM Jam Seminar
  Institut d'Astrophysique Spatiale, France

- *Magnetic fields in star-forming regions: from molecular clouds to cores*
  12/12/2014, National Astronomical Observatory of Japan, Japan

## 9  Visitor astronomer

- 2008/2016 (4 months): *Harvard-Sminthsonian Center for Astrophysics* (CfA, Cambridge, United States)
  **Collaboration on SMA and ALMA projects with Prof. Qizhou Zhang**;

- 2015 (1 week): I*nstitut d'Astrophysique Spatiale* (Orsay, France)
  Collaboration with *Planck* team

- 2013 (1 week): *Onsala Space Observatory* (Onsala, Sweden)
  **Implementation of polarization tools in CASA in collaboration with Prof. Wouter Vlemmings**;

- 2007/2008/2010 (3 months): *Instituto de Astrofísica de Canarias* (IAC, Tenerife Island, Spain)
  Collaboration on near-infrared polarization projects with Prof. José Acosta;

- 2007/2009 (3 months): *Argelander-Institut für Astronomie* (AIfA, Bonn University, Germany)
  Collaboration on VLA projects with Prof. Wouter Vlemmings;

- 2009 (1.5 months): *National Tsing Hua University* (Hsinchu, Taiwan)
  Collaboration on SMA projects with Prof. Shih-Ping Lai;

- 2008 (2 weeks): *Submillimeter Array* (SMA/ASIAA, Hawaii, United States)
  Collaboration on SMA projects with Dr. Ramprasad Rao;

## 10  Invited speaker in Scientific Meetings

- *The effects of magnetic fields on the dynamics of Young Stellar Objects*
  European Week of Astronomy Space Science, 2019, Lyon, France

- *Dust properties and magnetic fields: The wonders of disk polarization*
  Workshop on Polarization in Protoplanetary Disks and Jets, 2019, Sant Cugat, Spain

- *Polarization and chemistry in the early stages of star formation*
  Workshop on Interstellar Matter 2016, 2016, Sapporo, Japan

- *Polarization prospects with ALMA: an unprecedented view of magnetic fields*
  Magnetic Fields in the Universe IV, 2013, Playa del Carmen, Mexico

## 11  Attendance to scientific meetings and astronomy schools

- Oral contribution in more than 20 international meetings including the *Early Phases of Star Formation* (EPoS) and the *European Week of Astronomy and Space Science* (EWASS)

- Poster contribution in 15 international meetings including **dedicated ALMA meetings** (*First and Third year of ALMA Science*) and the *Annual Meeting of the Brazilian Astronomical Society* (SAB)

- Training schools for young astronomers: ISYA (2005), IRAM 30-m school (2007), VLA School (2008), TIARA (2009) and **ALMA-related workshops from the European ARC nodes (2009-2013)**.

## 12  Reviewer duties

- **Review panel member for ALMA Cycle 6 Proposal Review (2018)**

- Regular referee on star-formation papers from ApJ, A&A and AJ journals

## 13  Member in selection committees

- PhD positions for *Minerva* group (PI: Elena Redaelli)

- Postdoctoral positions for *Max Planck Research Group* (PI: Silvia Spezzano)

## 14    Theses supervised

- Doctorate

    - *Dynamical and chemical properties of magnetized cloud in the context of low-mass star-formation*

        Elena Redaelli (2017-2020) (Cum Laude)

    - *Laboratory work on high-precision molecular spectroscopy of molecular ions and radicals of astro-physical interest and observational tests of astrochemical models*

        Judit Ferrer (2020-in progress)

- Master

    - *Interstellar Ammonia Emission: Unveiling the Dynamics of a Star-Forming Core*

        Elena Redaelli (2015-2016)

    - *$C_3H_2$ emission from prestellar cores*

        Katharina Giers (2020-2021)

## 15    Theses committees

- *Observational and theoretical perspective of massive star formation*
  José Ignacio Añez López, Universitat de Barcelona
  PhD defense: May 5, 2021

## 16    Organisation of Conferences/Workshops

- **2022: Scientific Organising Committee of the** *Building bridges: The lifecycle of dust and gas in the Milky Way with ALMA and SKA* **Symposium**
  European Astronomical Society Annual Meeting (EAS 2022)
  Valencia, Spain (`https://eas.unige.ch/EAS2022/session.jsp?id=S7`)

- 2022: Local Organising Committee of *From Clouds to Planets II, The Astrochemical Link* conference
  Berlin, Germany (`https://events.mpe.mpg.de/event/12/`)

- 2011 – 2014: Organisation of tutorials and workshops on ALMA proposal preparation and data analysis for ALMA users on behalf of the German ARC node

- 2010: Local Organising Committee of the *Computational Star Formation* Symposium
  IAU Symposium 270
  Barcelona, Spain (`www.iaus270.org`).

## 17    Research grant and faculty position applications

- 2020: ERC Consolidator Grant. Step 2, final panel score: A (ranking rage: $80\% - 82\%$)

- 2019: FAPESP-Max Planck Society Grant: accepted for phase II (application withdrawn)

- 2011: Professorship position in Physics Department of UFMG. Approved but declined

## 18 Teaching experience

- 10/2018: Polarization and magnetic fields in Young Stellar Objects
  Invited lecturer in international school: ICCUB School on Protoplanetary disks in Young Stellar Objects
  Barcelona, Spain

- **10/2018: CASA and ALMA Observing Tool tutorials**
  Invited lecturer in international school: ICCUB School on Protoplanetary disks in Young Stellar Objects
  Barcelona, Spain

- **2011 – 2014: Polarization Techniques and CASA Tutorial, Practical Radio Interferometry**
  *Universität Bonn*

- 08/2005 – 11/2005: Teaching Assistant, Experimental Physics: Mechanics and Electromagnetism
  UFMG

- 08/2005 – 02/2006: Physics teacher
  *Colleguium* High-School

- 10/2002 – 02/2003: Teaching Assistant, Introduction to Experimental Physics
  UFMG

- 09/1998 – 09/2000: Teaching and public outreach, Observatório Astronômico Frei Rosário
  UFMG

## 19 Computer Skills

- Operating systems: Mac, Linux and Windows

- Astronomy software:
  Radio/submm data: CASA (ALMA), AIPS (VLA), MIRIAD (SMA), GILDAS (IRAM)
  Optical/near-infrated: IRAF (OPD, WHT), STARLINK GAIA (WHT)

- Programming languages: PYTHON and IDL

- Text editors: LaTeX, vi and Microsoft Word.

## 20 Volunteer in science outreach projects and organisational events

- ESO Supernova Planetarium & Visitor Centre (ESO)

- Outreach group of the Max Planck Institute for Extraterrestrial Physics (MPE)

- Organiser of the Journal Club from 2018-2019 in the CAS group at MPE

- *Ciência para Jovens* outreach project from Brazilian Embassy (Berlin)

- *Ciência para Crianças* outreach project from *Casa do Brasil e.V.* (Munich)

- *Terça Astronômica* project from GEDAI BH CEFET-MG (Belo Horizonte, Brazil)

## 21 Outreach seminars

- *Gestación Cósmica: Cómo Nacen Las Estrellas* (webinar)
  LABChico: Laboratorio Subterráneo de Mineral del Chico, Mineral del Chico, Mexico, 2020

- *Oficina de Astrofísica: Explorando o Cosmos*
  *Casa do Brasil e.V.*, Munich, Germany, 2019

## 22 Collaborator scientist in News media

- *Portal Diário do Aço* (`www.diariodoaco.com.br`)

## 23 Language proficiency

- native portuguese
- fluent english
- fluent spanish
- fluent catalan
- intermediate german

## 24 Career breaks

- 2017: Paternity leave (2 months full time)
- 2020: Paternity leave (2 months full time)

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### Research milestones

- **Major breakthroughs in studying the protostellar evolution with ALMA** (papers 1 to 4 in the LP as first author, including one *Science* paper and two *Letters*)
- First confirmation of radiative torques as main dust grain alignment mechanism (paper 6 in the LP)
- First evidence of magnetic fields as main source of support against global collapse (paper 10 in the LP)
- **Expert on mm/submm astronomy with state-of-the-art facilities (such as ALMA and APEX) as user and support scientist**

### Research interests

- Understand the driving mechanisms of the protostellar evolution through kinematics, magnetic fields and astrochemistry, from molecular clouds to cores to protoplanetary disks. Ultimately understand how our own Solar System was formed by focusing my research in star formation in the low-mass regime
- Exploit modern magneto-hydrodynamical simulations and radiative transfer tools that aid on the interpretation of observations