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Observational constraints on the evolution of dust in protoplanetary disks

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Citation

Martins e Oliveira, I. (2011, June 7). *Observational constraints on the evolution of dust in protoplanetary disks*. Retrieved from <https://hdl.handle.net/1887/17687>

Version: Corrected Publisher's Version

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Note: To cite this publication please use the final published version (if applicable).

Curriculum Vitæ

I was born in the midst of winter in Teresópolis (Brazil) to join my brother Gabriel in completing the world of our parents, Marcia & Hercules. 17 years later, after finishing high school (ensino médio) at Colégio Salesiano Santa Rosa, I started the B.Sc. in Physics at the Federal University of Rio de Janeiro (UFRJ). Alongside the classes, I soon started my Astrophysics career with an undergraduate research project at the National Observatory (ON), also in Rio de Janeiro. Working under the supervision of Dr. Ramiro de la Reza, I studied the metallicity of post-T Tauri stars in young associations, a project that was motivated by the high metallicity of planet-host stars.

After graduating from UFRJ, I moved to Baltimore (USA). There I was a research assistant at the Johns Hopkins University (JHU) for 1.5 years. At JHU I worked with Dr. Luciana Bianchi on the stellar population of the Large Magellanic Cloud with data from the outstanding Hubble Space Telescope (HST). Living in Baltimore was one of the greatest experiences of my life! There I became a grown-up. Following Baltimore, I moved to Leiden, where I completed my M.Sc. in Astrophysics in record time! For my Master project, I worked under the direct supervision of Dr. Bruno Merín characterizing the newly discovered young stellar population of the Serpens Molecular Cloud. During this time I had the opportunity to collect data at the William Herschel Telescope and the Telescopio Nazionale Galileo, both in La Palma (Spain).

I obtained my Master degree in February 2007 and was ready to start as a Ph.D. student. As such, I moved to Pasadena (USA), where I attended the California Institute for Technology (Caltech) for my entire first year. Combined with visits in the following years, I stayed in Pasadena almost as long as I did in Leiden during the 4 years of the program (complemented by many work trips and conferences abroad). In Leiden I was a teaching assistant to the ‘Data Mining’ course by Dr. Jarle Brinchmann, and the ‘Star Formation and Origin of Solar Systems’ course by Prof. Ewine van Dishoeck. I also had the amazing opportunity of supervising the research projects of two master students: Annelies Mortier and Margriet van der Laan.

During these 4 years I was fortunate to visit the Very Large Telescope (VLT, in Chile) twice and made several work visits to many great astronomy institutes spread across Europe: the Max-Planck Institut für Extraterrestrische Physik (MPE, in Germany), the European Space Research and Technology Center (ESTEC, in the Netherlands), the European Southern Observatory (ESO, in Germany), the Max-Planck Institut für Astronomie (MPIA, in Germany), the European Space Astron-

omy Center (ESAC, in Spain) and the Laboratoire d'Astrophysique de Grenoble (in France). A great part of this thesis is based on observations with the superb *Spitzer Space Telescope*. Although (unfortunately) one cannot visit this telescope to collect data, the incredible amount of IRS spectra I have reduced and analyzed during my thesis, in addition to hundreds of optical spectra, has transformed me into an avid spectroscopist. The results of these projects are presented in this thesis, most of which have also appeared as separate publications in *The Astrophysical Journal* and *Astronomy & Astrophysics*.

I have presented the results achieved during these 4 years at several international conferences and schools: Gainesville, Baltimore, Pasadena and New York (USA), Leiden (the Netherlands), El Escorial (Spain), Rio de Janeiro (Brazil), and Garching (Germany). Furthermore, noting that a greater interaction between specialists in stars, in protoplanetary disks, and in exo-planets was lacking, I worked to establish an environment where this interaction could be furnished. This became the 2009 EARA workshop at the Lorentz Center in Leiden, entitled "From Disks to Planets: Learning from Starlight", that I co-organized.

You could say I'm a lucky girl, huh? This upcoming fall I will continue my research in astrophysics as the Harlan J. Smith Postdoctoral Fellow at the University of Texas at Austin (USA).

Publications

Refereed Papers

1. *Young Stellar Objects in the Lupus Molecular Clouds* (Chapter 3)
Annelies Mortier, **Isa Oliveira** & Ewine F. van Dishoeck; submitted to the Monthly Notices of the Royal Astronomical Society
2. *Ruling Out Unresolved Binaries in 5 Transitional Disks – VLT/NACO Deep 2.12 and 1.75 μm Narrow-band Imaging*
Sílvia Vicente, Bruno Merín, Hervé Bouy, Markus Hartung, Nuria Huélamo, Étienne Artigau, Jean-Charles Augereau, Ewine van Dishoeck, Johan Olofsson, **Isa Oliveira**, Timo Prusti; submitted to Astronomy & Astrophysics
3. *On the Evolution of Dust Mineralogy, From Protoplanetary Disks to Planetary Systems* (Chapter 6)
Isa Oliveira, Johan Olofsson, Klaus M. Pontoppidan, Ewine F. van Dishoeck, Bruno Merín & Jean-Charles Augereau; The Astrophysical Journal, in press
4. *VLT/X-shooter Spectroscopy of a Dusty Planetary Nebula Discovered with Spitzer/IRS* (Chapter 5)
Isa Oliveira, Roderik A. Overzier, Klaus M. Pontoppidan, Ewine F. van Dishoeck & Loredana Spezzi; 2011, Astronomy & Astrophysics, 526, 41
5. *A Spitzer Survey of Protoplanetary Disk Dust in the Young Serpens Cloud: How do Dust Characteristics Evolve with Time?* (Chapter 4)
Isa Oliveira, Klaus M. Pontoppidan, Bruno Merín, Ewine F. van Dishoeck, Fred Lahuis, Vincent C. Geers, Jes K. Jørgensen, Johan Olofsson, Jean-Charles Augereau, Joanna M. Brown; 2010, The Astrophysical Journal, 714, 778
6. *A Spitzer c2d Legacy Survey to Identify and Characterize Disks with Inner Dust Holes*
Bruno Merín, Joanna M. Brown, **Isa Oliveira**, Gregory J. Herczeg, Ewine F. van Dishoeck, Sandrine Bottinelli, Neal J. Evans II, Lucas Cieza, Loredana Spezzi, Juan M. Alcalá, Paul M. Harvey, Geoffrey A. Blake, Amelia Bayo, Vincent C. Geers, Fred Lahuis, Timo Prusti, Jean-Charles Augereau, Johan Olofsson, Frederick M. Walter, Kuenly Chiu; 2010, The Astrophysical Journal, 718, 1200
7. *A Deep Optical/Near-Infrared Catalogue of Serpens*
L. Spezzi, B. Merín, **I. Oliveira**, E.F. van Dishoeck, J.M. Brown, 2010, Astronomy & Astrophysics, 513, 38

8. *c2d Spitzer-IRS Spectra of Disks Around T Tauri Stars. IV. Crystalline Silicates*
J. Olofsson, J.-C. Augereau, E.F. van Dishoeck, B. Merín, F. Lahuis, J. Kessler-Silacci, C.P. Dullemond, **I. Oliveira**, G.A. Blake, A.C.A. Boogert, J.M. Brown, N.J. Evans II, V.C. Geers, C. Knez, J.- L. Monin, K.M. Pontoppidan; 2009, *Astronomy & Astrophysics*, 507, 327
9. *Optical Spectroscopy of a New Young Stellar Population in the Serpens Molecular Cloud (Chapter 2)*
Isa Oliveira, Bruno Merín, Klaus M. Pontoppidan, Ewine F. van Dishoeck, Roderik A. Overzier, Jesús Hernández, Aurora Sicilia-Aguilar, Carlos Eiroa, Benjamin Montesinos; 2008, *The Astrophysical Journal*, 691, 672
10. *The Young Population of the Chamaeleon II Dark Cloud*
Loredana Spezzi, Juan M. Alcalá, Elvira Covino, Antonio Frasca, Davide Gandolfi, **Isa Oliveira**, Nicholas Chapman, Neal J. Evans II, Tracy L. Huard, Jes K. Jørgensen, Bruno Merín, Karl R. Stapelfedt; 2008, *The Astrophysical Journal*, 680, 1295
11. *The Spitzer c2d Survey of Large, Nearby, Interstellar Clouds. X. The Chamaeleon II Pre-Main Sequence Population as Observed with IRAC and MIPS*
Juan M. Alcalá, Loredana Spezzi, Nicholas Chapman, Neal J. Evans II, Tracy L. Huard, Jes K. Jørgensen, Bruno Merín, Karl R. Stapelfedt, Elvira Covino, Antonio Frasca, Davide Gandolfi, **Isa Oliveira**; 2008, *The Astrophysical Journal*, 676, 427
12. *Lyman Break Galaxies, Ly α Emitters and a Radio Galaxy in a Protocluster at $z = 4.1$*
Roderik A. Overzier, R.J. Bouwens, N.J.G. Cross, B.P. Venemans, G.K. Miley, A.W. Zirm, N. Benítez, J.P. Blakeslee, D. Coe, R. Demarco, H.C. Ford, N.L. Homeier, G.D. Illingworth, J.D. Kurk, A.R. Martel, S. Mei, **I. Oliveira**, H.J.A. Röttgering, Z.I. Tsvetanov, W. Zheng; 2008, *The Astrophysical Journal*, 673, 143
13. *Spatial Separation of Small and Large Grains in the Transitional Disk Around the Young Star IRS 48*
V.C. Geers, K.M. Pontoppidan, E.F. van Dishoeck, C.P. Dullemond, J.-C. Augereau, B. Merín, **I. Oliveira**, J.W. Pel; 2007, *Astronomy & Astrophysics*, 469, 35

Conference Proceedings

1. *Evolution of Dust in Protoplanetary Disks*
I. Oliveira, K.M. Pontoppidan, B. Merín, E.F. van Dishoeck; Disks, Meteorites, Planetesimals, held July 24-25, 2010 in New York, NY. Lunar and Planetary Science Institute
2. *Evolution of Young Stars and Their Disks in Serpens*
Isa Oliveira, Bruno Merín, Klaus M. Pontoppidan, Ewine F. van Dishoeck; 2010, *Highlights of Astronomy*, Volume 15, p. 731-731, IAU GA Rio de Janeiro

Thesis Acknowledgments

Not everybody has the opportunities they deserve in life. Deserving or not, I am most grateful for the many opportunities I had that led me here. The places, situations and people I met in life had a great impact on who I became and, although impossible to mention them all, I will do my best to acknowledge such inspiration in these pages.

I am a text-book Brazilian: hard-worker and under-appreciated, informal, and a dreamer. I'm proud to carry this inheritance and the green (now blue) passport with me wherever in the world I go.

Ramiro de la Reza, my passion for science and what things mean are a reflection of your knowledge and enthusiasm, while holding my hands as I took my first scientific steps. I wish every young student would have such pleasure.

Bruno Merín, your enthusiasm is contagious! I was very lucky to catch it when times were hard. *Klaus Pontoppidan*, your uncompromising science ethics and hard work are an inspiration, even when you're too tough.

Irma Black, Dian Buchness, Sarah DeFusco and Nora Oshima: all the time I've spent at Caltech was pleasant because of your hard work, always with a smile. The food and drinks in the PS department on special occasions are just so friendly. *Tycho Bot*, you've saved my life. I hope there'll always be computer support for the Sterrewachters.

Thiago e Karín, Pasadena mom and dad, obrigada por tudo. *Miles, Jason, Jamerson*, you were the coolest housemates. I miss the party house we shared at Los Robles. *Yolande, John and Elaine* - I feel at home in Leiden and a lot has to do with you. Thanks *Karin* for the tip.

Annelies Mortier, Margriet van der Laan, you taught me to teach. Always so patient and hard working. Keep going girls!

My office-mates: *Herma Cuppen*, you were a mother so much before Jop was born. *Umut Yildiz*, keep standing up for yourself, but remember to always be kind. *Emily Tenenbaum*, your grace and coolness made you a great fit for this green office.

Jon & Stephen, we had so many fun lunches together these past 4 years!

I was never as popular as I was at JHU, those friendships are forever: *Oiwei Ivy Wong, Ricardo Demarco, Nick Cross, Miriam García, Boryana Efremova, Alin Tolea, Sundar Srinivasan, Valentin Stanev, Zhuohan Liang, Manuchehr Taghizadeh-Popp* - I miss having you all around.

Friends coming and going in the Sterrewacht: *Dominic Schnitzeler, Stijn Wuyts*,

Liesbeth Vermaas, Ned Taylor, Elisabetta Micellotta, Vincent Geers, Niruj Mohan Ramanujam, Freeke van de Voort, the Pink Elephant and the party-goers, I surely am forgetting people... I had a lot of fun in and around Leiden with you. *Daniel Harsono, Ruud Visser, Lars Kristensen* and the *astrochem* group: our many coffee breaks were very much fun. *Edith Fayolle*, you'll be queen bee!

Being part of a big group was a great experience for me. I've learned so much in the c2d group meetings and telecons, and owe great gratitude to *Jean-Charles Augereau, Loredana Spezzi, Neal Evans, Paul Harvey, Juan Alcalá, Joanna Brown, Geoff Blake, Greg Herczeg, Rachel Smith. Johan Olofsson*, I found in you a collaborator for life, from the first meeting in Heidelberg to our papers together, you've been such a good colleague.

Music is very important in my life, working on my behalf when gravity wanted to bring me down. *Tom, Chico, Marisa, Dave, Diana, and John* are old friends, keeping the spirits up. *Harriët van den Berg*, I was never your best student, but I had a lot of fun with the flute. *Simone Pormes*, great fun we had singing Bossa Nova. Cantando eu mando a tristeza embora...

My fellow Nederlands cursisten *Mickey, Christiane, Felice, Jon, Andrés*, amongst many, leraren *Joke, Els, René* – wat een avontuur hadden we! It should be forbidden to mock those who venture themselves in a foreign language.

Of course, I must acknowledge the brave men and women who study as long as I did, but dedicate their lives to save the lives of others. The fact that I can type this with my own two hands speaks for itself. May science continue to make people's lives better and longer.

Jeanne, Marnix, Natasja, Lianne, Finn en Ria, de steun van familie op slechts een korte treinreis afstand stelde mij op mijn gemak en maakte dat ik me altijd welkom voelde in dit land.

Marcia, Lola, Gabriel, Mara, Joel, Sylvia, Daniel, Cintia, Gustavo, Théo e João Gabriel: quem eu sou devo a vocês. Seu apoio, vocal ou silencioso, me dá a certeza de que nunca estou sozinha, onde quer no mundo que eu esteja. *Mãe*, você me ensinou a nunca desistir. *Hercules* estaria orgulhoso (de mim e de vocês). Juntos, não tem para ninguém – somos brasileiros e não desistimos nunca!

Roderik, my prince charming, you keep me where the light is!

Follow your dreams, search for your own opportunities and work hard, fulfil your duties, demand your rights, and have fun – life is happening right now.

*“Eu nasci assim
Eu cresci assim
Eu sou mesmo assim
Vou ser sempre assim”*

Dorival Caymmi