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Bridging the gap between physics and chemistry in early stages of star formation

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Curriculum Vitae

I was born in a small town in Iran close to Lut desert (see the thesis cover). My home town is famous for its pistachios (Rafsanjan) and my family, similar to many others in this town, are in the pistachio business. But my father was always very interested in physics and was my inspiration from an early age. I had all my pre-university education in my home town and it was always my dream to become a scientist. When I was in middle school, I remember trying to gather biographies of the scientists that I admired to learn how I could become one. Later in high school, I especially enjoyed the physics classes with one memory particularly vivid. After our lesson about blackbody radiation I was in awe for an entire week that everything around me was emitting radiation. Little did I know that the most fundamental concept in my PhD thesis will be on this same lesson years later. After high school, my aunt, Sareh Vosooghi, encouraged me to do my Bachelor's degree in the UK. With her, my father, my mother, and my sister's supports, I was privileged enough to get a position at St Andrews where the journey to this thesis started.

During my Bachelor's degree at St Andrews I approached one of my lecturers, Claudia Cyganowski, to inquire whether she was planning on getting a summer student. I was happy that she and John Ilee accepted me for a project on astrochemistry of a massive young stellar object which later resulted in my first ever paper. That was when I initially learned about astrochemistry, or doing research more generally, and became very excited about it. Since that summer I was lucky enough to participate in more summer programs at Cambridge and Harvard where I worked with Cathie Clarke, Karin Öberg, Giovanni Rosotti, Farzana Meru, and Richard Booth. The results of those were also published in two papers. I finished my Bachelor's project at St Andrews with Claudia Cyganowski winning the Astrophysics Project Prize (that work also later resulted in two publications), before doing my Master's degree at Cambridge working with Cathie Clarke and Bob Carswell. I learned so much from these experiences and am grateful for my interactions with all of these great scientists.

With my early knowledge about astrochemistry, I always wanted to work with Ewine van Dishoeck at some point in my career. I was honored when Ewine accepted me as her PhD student. However, my PhD started slow with no publications up to the middle of my second year. I had already missed a full year

and was very much behind my initial plan. One major reason was COVID but more importantly my wrong mindset and low self confidence. I was fortunate enough to meet my partner, Danial Langeroodi, just before the end of my first year who made it clear to me where I was going wrong and helped me gain some confidence in myself, for which I will forever be grateful. Once I amended my ways, I managed to work with gas-phase observations of ALMA, ice observations of JWST, and RADMC-3D models during my PhD. Of course these would not be possible without the help from Benoît Tabone and Giovanni Rosotti. I now have 24 publications with 10 as first author.

It is also important to acknowledge an event which I never talked or wrote about but affected my PhD. My grandfather was killed by a Taliban member at his doorstep in Iran during my third year (April 2022). It did not happen because of a fight but happened because my grandfather had expressed his thoughts on religion openly earlier that day and the young boy who committed the crime had got an order from his higher up in Afghanistan that those thoughts do not align with their views and thus he had to die. This event was and still is a shock for everyone in my family and made it so clear to me that if we do not teach young people to think for themselves, the consequences could be devastating. Of course this is a small event in the grand scheme of what is happening in the middle east and the world in general but it woke me up. For the first time, I realized that as a scientist I have to help young minds learn to think critically and I can only have a wider reach if at this stage in my career I do the best I can. I am not thankful for this event but it gave me a lot of motivation to do the best PhD I could.

Over the past four years, I was a teaching assistant over four semesters for the star and planet formation course and the astrochemistry course. I co-supervised three MSc students and one LEAPS student. I was one of the two organizers of the NOVA Network II seminars in the Netherlands. I made frequent research visits to the Centre for Star and Planet Formation at Copenhagen and an extended research visit to the Center for Astrophysics at Harvard during my PhD. I have given 22 talks (7 invited). In particular, the work of this thesis has been presented in meetings and conferences at Cambridge, Torino, Copenhagen, Harvard, Michigan, Virginia/NRAO, Arizona, Groningen, Aarhus, and Leiden as well as online meetings such as the astrochemical frontiers and Iranian National Observatory workshop.

For the next few years in my career, I am honored for having been awarded the ESO Fellowship in Germany and the IAU Gruber Foundation grant to hire summer students from Iran and other less privileged countries. I am very grateful for having been added to the ALMA COMPASS (PI: Jes Jørgensen) and JWST JOYS+ (PI: Ewine van Dishoeck) collaborations and hope for a lot of exciting science in the coming years.

Publications

First-author:

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Second-fourth author:

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