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Curriculum Vitae

Education

- 2007-2015** Tarczy Lajos Primary School, Hungarian-English bilingual class, Pápa
- 2015-2020** Türr István Secondary School, Pápa
- 2020-2023** Eötvös Loránd University (ELTE), BSc in Physics, specialisation in Astronomy, Budapest
Diploma with honours, average grade: 4.92 (out of 5.0)
Thesis title: *Dynamical effects of Type II supernova explosions in binary and triple systems*
Supervisor: Zsolt Regály
- 2023-** Eötvös Loránd University (ELTE), MSc in Astronomy, Budapest
Average grade in the first two semesters: 4.91 (out of 5.0), expected graduation: 2026,
Thesis title: *The origin of Ca II triplet emission around white dwarfs*
Supervisor: Zsolt Regály

Grants, scholarships, awards, and competitions

- 2020** International Olympiad on Astronomy and Astrophysics, national 12th place
- 2021** MCSE–CSFK Article Writing Competition, 3rd place
ELTE Astronomy Scientific Students' Conference, 2nd place
- 2022** ELTE Astronomy Scientific Students' Conference, 3rd place
National Higher Education Scholarship (1,000 EUR)
- 2023** National Scientific Students' Conference (OTDK), 2nd place
ELTE Outstanding Student of the Faculty Award
National Higher Education Scholarship (1,000 EUR)
New National Excellence Program – Master's Student Research Fellowship (2,500 EUR)
TÉT French–Hungarian cooperation grant (PI: Zsolt Sándor, 10,000 EUR)
ELTE Astronomy Scientific Students' Conference, 1st place
- 2024** University Research Scholarship – Master's Student Research Fellowship (3,750 EUR)
ELTE Astronomy Scientific Students' Conference, 1st place
- 2025** National Scientific Students' Conference (OTDK), two 1st places with two theses
Pro Scientia Medalists' Society "Hope" Award
Pro Scientia Gold Medal (highest achievement in Hungary for undergraduates for outstanding research activities)
National Higher Education Scholarship (1,000 EUR)
University Research Scholarship – Master's Student Research Fellowship (3,100 EUR)
ELTE Faculty of Science Travel Grant (2 x 300 EUR)
Included in the "Most excellent 2024/2025 University Research Scholarship projects" list
ELTE Astronomy Scientific Students' Conference, 1st place
- 2026** Hettyei János Award for outstanding contributions to amateur astronomy, science outreach and research in astronomy

Professional activities

- 2021-** Research assistant at HUN-REN Konkoly Observatory (Supervisor: Zsolt Regály)
- 2023** Eötvös Conference poster
4th Advanced School on Exoplanetary Science participant
Impacts and their Role in the Evolution of Life Summer School participant
ELTE Astropizza seminar invited talk
- 2024** (Toward) Discovery of Life Beyond Earth and its Impact School online participant

2025	The Birth of Solar Systems Spring School	poster and contributed talk
	Research visit, Deutsches Zentrum für Luft- und Raumfahrt	invited seminar talk
	Star Formation, Stellar Feedback, and the Ecology of Galaxies - Celebrating John Bally's Lifetime in Astronomy	invited talk and star party
	The Art of the Invisible Force: The Dynamics of Equilibria Near and Far - Scientific Conference in Honor of Bálint Érdi	participant
	Research visit, Max Planck Institute for Astronomy, Heidelberg	talk (x2)
	Alpbach Summer School	participant
	Winner: Best Science Case for a Mission	
	Assembly of Hungarian Astronomers	contributed talk
	II. National Space Congress	invited talk
	ELTE Astropizza seminar	invited talk
	Rogue Worlds Two conference	talk (x2)

Public engagement

2020-2024	Member, Hungarian Astronomical Association
2021-	Member, Vega Astronomical Association
2021-2024	Vega Astronomical Association Certificates of Recognition (each year, for high-quality observations, outreach talks, and promoting amateur astronomy)
2022-	Executive Council member, Vega Astronomical Association
2022-2024	The Universe to Youths Erasmus+ project management (PI: Szilárd Csizmadia, 60,000 EUR)
2024-	Scientific reviewer, Hungarian Space Research Nonprofit Ltd. (CEO: Örs Hunor Detre)

Scientific publications

2022	Regály, Fröhlich & Vinkó, ApJ 941, 121: <i>Lost in Space: Companions' Fatal Dance around Massive Dying Stars</i>
2023	Fröhlich, Regály & Vinkó, MNRAS 523, 4: <i>Double Neutron Star Formation Via Subsequent Type II Supernova Explosions</i>
	Regály, Fröhlich & Berczik, A&AL 667, L6: <i>Mitigating Potentially Hazardous Asteroid Impacts Revisited</i>
2024	Fröhlich & Regály, A&A 692, A25: <i>Origin of Ca II Emission around Polluted White Dwarfs</i>
2025	Regály, Fröhlich & Kiss, A&A 697, A116: <i>Celestial Sunflowers – Survival of Rings around Small Planetary Bodies under Solar Radiation Pressure</i>
	Regály, Fröhlich & Vinkó, ApJL 988, L7: <i>Fine-Tuned Supernova or Failed Explosion? Decoding the Origins of the G3425 Binary</i>
	Regály, Fröhlich & Kiss, PASP, 137, 11: <i>Limits of Standard Tidal Models at Quaoar: Matching Weywot's Orbit, Missing the Spin</i>
	Fröhlich & Regály, A&A, 704, A349: <i>Life in the dark. Potential urability of moons of rogue planets</i>
2026	Regály, Fröhlich & Kiss, in press at PASP: <i>Rings Around Non-Spherical Worlds: Sub-mm Dust Retention Around Triaxial Small Bodies in the Solar System</i>

Research experience:

2021 -	Dynamical effects of type II supernovae During my research, I developed a Python code to numerically integrate a two- or three-body problem with a central star that loses mass according to a homologous expansion model as it explodes as a Type II supernova. I calculated the perturbations in the orbital elements of the companions and studied the fate of the systems. The configurations studied included exoplanets with and without moons, and binary star systems with and without an exoplanet. Analysis and interpretation of the data showed that Type II SN are a highly effective channel for the formation of binary neutron stars, high peculiar velocity stars and rogue planets, as well as high eccentricity tidally heated exomoons around the rogue planets. Supervisor: Zsolt Regály
2021 -	Origin of asymmetric Ca II lines around polluted white dwarfs I developed Python code to numerically calculate emission lines from the surface density and velocity field of an optically thin gas disk. I used this to calculate Ca II emission around metal-polluted white dwarfs. The evolution of the disks was modelled by running simulations with the grid-based 2D hydrodynamical code GFARGO2. I followed the evolution of the disks and the Ca II emission on yearly timescales and was able to reconstruct the asymmetry and periodicity of the emission in the observed

polluted WD systems.

Supervisor: Zsolt Regály

2022 - 23 Dynamics and possible mitigation strategies of near-Earth asteroids and long-period comets

Our group studied the effect of orbital dynamics on the expansion of a debris cloud following the explosion of an Earth-threatening asteroid. My role was to set up the parameter space, which involved familiarising myself with the JPL Horizons system and interpreting and analysing data from the HIPERION and PhiGPU high-precision integrators.

Supervisor: Zsolt Regály

2023 - Formation of highly eccentric warm Jupiters in protoplanetary discs

My role is to perform simulations of protoplanetary disks with an inner gap and a Jupiter-sized planet embedded in them, using the GFARGO2 code to reproduce the migration evolution of Jupiter-sized planets observed orbiting close to their stars.

Supervisor: Zsolt Sándor

2024 - Minor bodies in the Solar System: moons, ring formation and stability, tidal evolution

We carried out 3D SPH simulations of small body collisions to study the formation of moons and rings. I learnt to interpret the data obtained from the MiluphCUDA software using the h5py package. We also studied the stability of moons and rings under solar radiation pressure and PR drag. I have carried out simulations on Gy timescales to study the effect of tidal evolution on the orbital parameters of moons of minor planets. For this I used the TidyMess and TideR codes.

Supervisor: Zsolt Regály

2025 - Mass loss in eccentric Wolf-Rayet star systems

I developed a Python code to model mass loss in the eccentric Wolf-Rayet system WR 140 to study its long-term evolution (whether the system is stable or will fall apart), and to estimate the birth masses of the components, taking into account a Wolf-Rayet wind and developing a periastron-centred mass loss model.

Supervisor: Zsolt Regály

Popular science articles

Published in Meteor, Fizikai Szemle, Természet Világa, Érintő, VEGA, vcse.hu, csillagaszat.hu, etc.; mostly in Hungarian. Numerous outreach pieces on astronomy, planetary science, supernovae, white dwarfs, exoplanets, and amateur astronomy. Full list available on request.

Public lectures and outreach talks

Regular lectures at primary and secondary schools, astronomy clubs, summer camps, public telescope demonstrations and star parties, and invited talks including VEGA Astronomy Club, national Messier marathons, *A Week Under the Stars* event in Budapest, etc. Full list available on request.

Media appearances

2024 Pápa TV News; ZAOL; VEOL; Pápa Radio – interviews on astronomy outreach

2025 Life and Science magazine, Researcher of the Week interview: *Rogue Planets in the Milky Way*

Computer skills

Advanced level in Python and vector graphics skills for creating scientific illustrations

Intermediate level in Bash, Mathematica

Operating system familiarity with MacOS, Linux, Windows

Languages

2017 English: C1 certificate

2019 German: B2 certificate

Hobbies

Reading, playing the guitar, cycling, photography, music, drawing