

Department of Astronomy  
 The University of Texas at Austin  
 2515 Speedway, Stop C1400  
 Austin, TX 78712

guszejnov@utexas.edu  
 skype: guszejnov.david

### EMPLOYMENT

2018 – **Postdoctoral Scholar**, Harlan J. Smith Prize Fellowship  
 McDonald Observatory, University of Texas at Austin

### EDUCATION

2018 **PhD in Physics**, California Institute of Technology.  
 Thesis: On the Origin of Scales and Scaling Laws in Star Formation.  
 Advisor: Prof. Philip F. Hopkins.

2013 **M. S. in Physics**, Budapest University of Technology.  
 Thesis: Statistical Analysis of Density Fluctuations in Toroidal Plasmas.  
 Advisor: Dr. Attila Bencze.

2011 **B. S. in Physics**, Budapest University of Technology.  
 Thesis: Simulation of Beam Emission Spectroscopy Diagnostics.  
 Advisor: Dr. Gergő Pokol.

### PUBLICATIONS

**Refereed:** 11 first author papers, 3 co-authored papers (see attached publication list).

**Metrics:** 142 citations, h-index: 8

### AWARDS & HONORS

2017 **Sai Wai and Beatrice Fu Graduate Fellowship** at Caltech.

2012 **Erasmus Scholarship**, exchange program within EU.

2011 **Excellent Student of Natural Sciences** at Budapest Univ. of Technology.  
 University prize, awarded to one physics major every year.

2011 **1st Prize at National Scientific Student Conference** in Hungary.  
 Competition between undergraduate research theses.

2010–2012 **Scholarship of the Republic**.  
 National prize in Hungary for excellent undergraduate students.

### RECENT & UPCOMING TALKS

#### **Invited talks**

2017 Nov UT Austin, Theory Seminar

2017 Oct UC Santa Cruz, Friday Lunch Time Astrophysics Seminar (FLASH).

2017 Apr UM Amherst, Star Formation Lunch.  
 Princeton, Star Formation/ISM Rendezvous seminar series

#### **Conferences**

2018 June Poster at the *Olympian Symposium 2018*

2018 Jan AAS 231

2017 Apr Poster at *Multi Scale Star Formation*, hosted by UMSNH

2016 Aug Poster at *Star Formation 2016*, hosted by University of Exeter

2016 June AAS 228

2016 Apr *From Stars To Massive Stars*, hosted by Univ. of Florida

2015 Nov *Theoretical Astrophysics in Southern California 2015*

**RESEARCH INTERESTS**

I am a theoretical astrophysicist mostly interested in the rich phenomena of star formation. I utilize both analytical and numerical tools to answer questions like: What regulates star formation? What sets the characteristic mass of stars? Why are stars clustered? How is star formation different in other galaxies?

**SYNERGISTIC ACTIVITIES & OUTREACH**

2018 – Public talks (Astronomy on Tap)

2016 – **Machine learning projects:**

- NEAT learning scheme to teach a computer to play Snake
- Application of reinforcement learning schemes (Temporal Difference, Deep Q etc.)
- Course in machine learning

2014 Election data analysis, looking for statistical signs of fraud

2011–2013 Public talks at high schools about various physics topics (e.g. quantum mechanics)

2011 Founding member of Eugene Wigner College (university student organization)

**TEACHING****California Institute of Technology**

2014-2018 Waves, Quantum and Statistical Mechanics (Ph2). Undergraduate course.  
Recitation TA with office hours & quiz review sessions (8 terms).

2013-2014 Classical Mechanics & Electrodynamics (Ph1). Undergraduate course  
Recitation TA with office hours & quiz review sessions (4 terms) .

**Budapest University of Technology and Economics**

2010-2013 Single and Multivariable Calculus (MatA1,MatA2) undergraduate courses.  
Recitation TA (3 semesters)

2010 Private tutor.

High school level mathematics and chemistry for university entrance exam.

**SKILLS**

Coding: Python, C, Matlab, Wolfram Mathematica, IDL, C++

Methods: Monte Carlo, Machine learning, MPI

Modeling: Random walk, Markov chains, Self-similar processes, Hydrodynamics

Languages: English (Fluent), German (Beginner), Hungarian (Native)

**First Author Publications**

11. **Guszejnov D.**, Hopkins P. F. (2018), *Is it possible to reconcile extragalactic IMF variations with a universal Milky Way IMF?*, to be submitted to MNRAS.
10. **Guszejnov D.**, Hopkins P. F., and Grudić M. Y. Krumholz, M. and Federrath, C. (2018), *Isothermal Fragmentation: Is there a low mass cut-off?*, MNRAS, 468, 4093-4106.
9. **Guszejnov D.**, Hopkins P. F., and Grudić M. Y. (2017), *Universal Scaling Relations in Scale-Free Structure Formation*, MNRAS, 477, 5139-5149.
8. **Guszejnov D.**, Hopkins P. F., and Ma X. (2017), *Comparing Models for IMF Variation Across Cosmological Time in Milky Way-like Galaxies*, MNRAS, 472, 2107-2116.
7. **Guszejnov D.**, Hopkins P. F., and Krumholz M. R. (2017), *Protostellar feedback in turbulent fragmentation: consequences for stellar clustering and multiplicity*, MNRAS, 468, 4093-4106.
6. **Guszejnov D.**, Krumholz M. R., and Hopkins P. F. (2016), *The Necessity of Feedback Physics in Setting the Peak of the Initial Mass Function*, MNRAS, 458, 673-680.
5. **Guszejnov D.**, and Hopkins P. F. (2016), *Star formation in a turbulent framework: from giant molecular clouds to protostars*, MNRAS, 459, 9-20.
4. **Guszejnov D.**, and Hopkins P. F. (2015), *Mapping the core mass function to the initial mass function*, MNRAS, 450, 4137-4149.
3. **Guszejnov D.**, Lazányi N., Bencze A., and Zoletnik S. (2013), *On the effect of intermittency of turbulence on the parabolic relation between skewness and kurtosis in magnetized plasmas*, Physics of Plasmas, 20, 112305.
2. **Guszejnov D.**, Bencze A., Zoletnik S. and (2013), *Determination of Structure Tilting in Magnetized Plasmas - Time Delay Estimation in Two Dimensions*, Physics of Plasmas, 20, 062303.
1. **Guszejnov D.**, Pokol G. I., Pusztai I., Réfy D., Zoletnik S., Lampert M., and Nam Y. U. (2012), *Three-dimensional modeling of beam emission spectroscopy measurements in fusion plasmas*, Review of Scientific Instruments, 83, 113501.

**Co-Authored Publications**

3. Grudić M. Y., **Guszejnov D.**, Hopkins P. F., Lamberts A., Boylan-Kolchin M., Murray N., and Schmitz D. (2017), *From the Top Down and Back Up Again: Star Cluster Structure from Hierarchical Star Formation*, MNRAS, 481, 688-702.
2. Lampert M., Anda G., Czopf A., Erdei G., **Guszejnov D.**, Kovácsik Á., Pokol G. I., Réfy D., Nam Y. U., and Zoletnik S. (2015), *Combined hydrogen and lithium beam emission spectroscopy observation system for Korea Superconducting Tokamak Advanced Research*, Review of Scientific Instruments, 86, 073501.
1. Landreman M., Fülöp T., and **Guszejnov D.** (2011), *Impurity flows and plateau-regime poloidal density variation in a tokamak pedestal*, Physics of Plasmas, 18, 092507.