

Károly Zoltán Csukás

CONTACT INFORMATION

Cellphone: +1 (662) 715-7177
E-mail: csukas.karoly@wigner.hu
Web: <https://wigner.hu/~csukas/>
ORCID: <https://orcid.org/0000-0002-2408-1103>

The University of Mississippi
University, MS
Lewis Hall 126
38677

RESEARCH OBJECTIVE

I am a relativist studying black hole spacetimes utilising numerical methods. The codes I develop use spectral approach in the angular directions and finite difference techniques in the remaining variables. This way we studied linear perturbations over Kerr background, noticing that a mysterious reflection mitigates superradiance, and perturbed Schwarzschild initial data, demonstrating the usefulness of the evolutionary form of the constraints.

EDUCATION

Graduate studies

Loránd Eötvös University, Budapest
Doctoral School of Physics, Particle Physics and Astronomy program,
Research carried out at Wigner RCP, Theoretical Physics Department
Degree earned: Oct 2021

Thesis Topic: *Numerical investigation of linear perturbations and solutions to constraint equations in general relativity*
Advisor: István Rácz, DSc

Undergraduate studies

M.Sc., Particle Physics, 2015
Loránd Eötvös University, Budapest
Topic: *Stability of Codimension-2 Surfaces in General Relativity*
Advisor: István Rácz, DSc

B.Sc., Physics, 2012
Loránd Eötvös University, Budapest
Topic: *Particle's Lagrangian in Minkowski and FLRW spacetimes*
Advisor: Balázs Vető, Dr

POSITIONS HELD

Postdoctoral Research Associate, from 2021 to present
The University of Mississippi,
Department of Physics and Astronomy
Research Assistant (PhD student), from 2015 to 2021
Wigner Research Centre for Physics,
Theoretical Physics Department

REFEREED JOURNAL PUBLICATIONS

- K. Z. Csukás, I. Rácz “*Numerical investigation of the dynamics of linear spin s fields on a Kerr background II: Superradiant scattering*”, 2021, *Phys Rev D* 103, 084035, doi:10.1103/PhysRevD.103.084035
- K. Z. Csukás, I. Rácz “*Numerical investigations of the asymptotics of solutions to the evolutionary form of the constraints*”, 2020. *Class Quantum Grav* 37, 155006, doi:10.1088/1361-6382/ab8fce
- K. Z. Csukás, I. Rácz, G. Zs. Tóth “*Numerical investigation of the dynamics of linear spin s fields on a Kerr background I. Late time tails of spin $s = \pm 1, \pm 2$ fields*”, 2019. *Phys Rev D* 100, 104025, doi:10.1103/PhysRevD.100.104025
- K. Z. Csukás “*Geometric Inequalities in Spherically Symmetric Spacetimes*”, 2017. *Gen Relativ Gravit* 49:94, doi:10.1007/s10714-017-2256-1

ORAL PRESENTATIONS

- *Superradiant scattering of wave packets with compact initial support*
12th Central European Relativity Seminar,
21-23 February 2022, Budapest, Hungary (online participant)
- *Időfejlődés minden irányban*
Simonyi Memorial Day,
19 Oct 2020, Budapest, Hungary
- *On the asymptotics of initial data by evolutionary solvers*
22nd International Conference on General Relativity and Gravitation,
7-12 Jul 2019, Valencia, Spain
- *Some results on geometric inequalities in spherically symmetric spacetimes*
8th Central European Relativity Seminar,
15-17 Feb 2018, Brno, Czech Republic
- *Notes on geometric inequalities in spherically symmetric spacetimes*
Spanish-Portuguese Relativity Meeting,
12-15 Sept 2017, Málaga, Spain

POSTERS

- *On the asymptotics of solutions to the evolutionary form of the constraints*
9th Central European Relativity Seminar,
14-16 Feb 2019, Krakow, Poland

GRANTS AND AWARDS

- *The Györgyi Géza Award*
Wigner Research Centre for Physics
18 Oct 2021, Budapest, Hungary
- *COST Action Inclusiveness Target Countries Conference Grants*
CA16104 Gravitational waves, black holes and fundamental physics
22nd International Conference on General Relativity and Gravitation,
7-12 Jul 2019, Valencia, Spain
- *COST Action Inclusiveness Target Countries Conference Grants*
CA16104 Gravitational waves, black holes and fundamental physics
9th Central European Relativity Seminar,
14-16 Feb 2019, Krakow, Poland
- *COST Action Short Term Scientific Mission*
CA16104 Gravitational waves, black holes and fundamental physics
April 3-April 30, 2019, Warsaw, Poland

- *COST Action Short Term Scientific Mission*
CA16104 Gravitational waves, black holes and fundamental physics
Jan 3-April 2, 2019, Warsaw, Poland
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MEMBERSHIPS

- *GWverse COST Action CA16104*
WG2: Source modelling
2019-
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LANGUAGE AND SKILLS

- english
 - good knowledge at reading, writing and speaking
 - exam: upper-intermediate (B2) level, 2008, certificate no.: 1025534
- italian
 - basic knowledge at reading, writing and speaking
 - exam: intermediate (B1) level, 2020, certificate no.: 2100818
- Mathematica, Maple for prototyping algorithms and symbolic manipulation
- C/C++
- GNU Make, CMake
- git