

# SHOKHRUKH KHOLMATOV

## CURRICULUM VITAE

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### Contact

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### Research interests

**Main research fields:** geometric measure theory, calculus of variations, partial differential equations, spectral theory of self-adjoint operators, multi-particle discrete Schrödinger operators in lattice.

**Main keywords:** free boundary problems, nonlinear PDEs,  $\Gamma$ -convergence, variational techniques, (anisotropic) mean curvature flow, minimizing-movement method, regularity of minimizers, thin films, crystal interfaces, spectrum of the linear operators in Hilbert spaces, lattice Schrödinger operators, multi-particle bound states, Efimov effect, Thomas effect.

### Education

2017 PhD in Mathematics, ICTP-SISSA, Trieste, Italy

Thesis: *Minimizing movements for mean curvature evolutions of droplets and partitions*

Supervisor: Prof. Giovanni Bellettini

2013 Diploma in Mathematics, ICTP, Trieste, Italy

Thesis: *Classifications of subshifts of finite type*

Supervisor: Prof. Stefano Luzzatto

- 2012 PhD in Physics and Mathematics, Samarkand State University, Uzbekistan  
Thesis: *Asymptotics of eigenvalues of two-particle Schrödinger operators in lattice*  
Supervisor: Acad. Prof. Saidakhmat Lakaev
- 2010 MSc in Mathematics, Samarkand State University, Uzbekistan  
Supervisor: Acad. Prof. Saidakhmat Lakaev
- 2008 BSc in Mathematics, Samarkand State University, Uzbekistan  
Supervisor: Acad. Prof. Saidakhmat Lakaev

## Professional Career

Apr 2021 *Postdoctoral Associate*, Faculty of Mathematics, University of Vienna, *Project leader* in  
Mar 2025 the FWF Stand-Alone Project P 33716

Jan 2019 *Postdoctoral Associate*, Faculty of Mathematics, University of Vienna, *Project leader* in  
Mar 2021 the FWF Lise Meitner Project M 2571

Oct 2017 *Postdoctoral Associate*, Faculty of Mathematics, University of Vienna, in the research  
Dec 2018 group [Variational Methods and Applications](#) of [Paolo Piovano](#)

Feb 2015 *Diploma Tutor*, ICTP, Trieste, Italy  
May 2016

Sep 2010 *Lecturer*, Samarkand State University, Uzbekistan  
June 2012

## Invited conference presentations: (Selected from the last 5 years)

- Sep 23-24, 2022, *Mathematical Analysis and its applications in modern Mathematical Physics* Samarkand, Uzbekistan
- Dec 15-17, 2021, *The Third Russia-Japan Workshop (online)* Novosibirsk, Russian Federation
- Dec 15-17, 2020, *The Second Russia-Japan Workshop (online)* Novosibirsk, Russian Federation
- Oct 17 – 18, 2019, *First Austrian Calculus of Variations Day*, Vienna, Austria
- Feb 4 – 8, 2019, *XXIX Convegno Nazionale di Calcolo delle Variazioni*, Levico Terme, Italy

## Publication list

### Preprint

- Sh. Kholmatov, P. Piovano:  
Existence of minimizers for the SDRI model in  $\mathbb{R}^n$ : Wetting and dewetting regimes with mismatch strain.  
Submitted (2023).

### Peer-reviewed

- Sh. Kholmatov, P. Piovano:  
Existence of minimizers for the SDRI model in 2d: Wetting and dewetting regimes with mismatch strain.  
*Adv. Calc. Var.* (2023).
- G. Bellettini, Sh. Kholmatov:  
Some aspects of anisotropic curvature flow of planar partitions.  
*Ensaio Mat.* **38** (2023), 23–76.
- Sh. Kholmatov, A. Khalkhuzhaev, M. Pardabaev:  
Expansion of eigenvalues of rank-one perturbations of the discrete bilaplacian.  
*Monats. Math.* **197** (2022), 607–633.
- Sh. Kholmatov, S. Lakaev, F. Almuratov:  
*On the spectrum of Schrödinger-type operators on two dimensional lattices.*  
*J. Math. Anal. Appl.* **514** (2022), 126363.
- S. Lakaev, Sh. Kholmatov, Sh. Khamidov:  
*Bose-Hubbard models with on-site and nearest-neighbor interactions: Exactly solvable case.*  
*J. Phys. A: Math. Theor.* (2021).
- Sh. Kholmatov, S. Lakaev, F. Almuratov:  
*Bound states of discrete Schrödinger operators on one and two dimensional lattices.*  
*J. Math. Anal. Appl.* **503** (2021), 125280.
- Sh. Kholmatov, M. Pardabaev:  
*Asymptotics of eigenvalues of the zero-range perturbation of the discrete bilaplacian.*  
*Lobachevskii J. Math.* **42** (2021), 1285–1292.

- G. Bellettini, A. Chambolle, Sh. Kholmatov:  
*Minimizing movements for forced anisotropic mean curvature flow of partitions with mobilities.*  
Proc. Roy. Soc. Edinburgh Sect. A (2020).
- Sh. Kholmatov, P. Piovano:  
*A unified model for stress-driven rearrangement instabilities.*  
Arch. Rational Mech. Anal. **238** (2020), 415-488.
- G. Bellettini, A. Chambolle, Sh. Kholmatov:  
*Minimizing movements for forced anisotropic mean curvature flow of partitions with mobilities.*  
Proc. R. Soc. Edinburgh Sec. A: Math. (2020).
- G. Bellettini, Sh. Kholmatov:  
*Minimizing movements for mean curvature flow of partitions.*  
SIAM J. Math. Anal. **50** (2018), 4117–4148.
- G. Bellettini, Sh. Kholmatov:  
*Minimizing movements for mean curvature flow of droplets with prescribed contact angle.*  
J. Math. Pures Appl. **117** (2018), 1–58.
- Sh. Kholmatov, Z. Muminov:  
*Existence of bound states of  $N$ -body problem in an optical lattice.*  
J. Phys. A: Mat. Theor. **51** (2018).
- G. Bellettini, M. Novaga, Sh. Kholmatov:  
*Minimizers of anisotropic perimeters with cylindrical norms.*  
Comm. Pure Appl. Anal. **16** (2017), 1427–1454.
- S. Lakaev, Sh. Kholmatov:  
*Asymptotics of the eigenvalues of a discrete Schrödinger operator with zero-range potential.*  
Izvestiya: Mathematics **76** (2012), 946–966.
- S. Lakaev, Sh. Kholmatov:  
*Asymptotics of the two particle Schrödinger operators on lattices with zero-range interaction.*  
J. Phys. A: Math. Theor. **44** (2011).