

## Curriculum Vitae

### Personal Information

Family Name: *Velichkov*    First Name: *Bozhidar*    Web Page: [www.velichkov.it](http://www.velichkov.it)

### Current Position

Since 1 April 2019, I am *Professore Associato* (Associate Professor) at *Università degli Studi di Napoli Federico II* (Naples, Italy), where I work on **free boundary problems arising in calculus of variations and shape optimization.**

### Career and cursus

**09/2014 - 03/2019.** I was **Assistant Professor** (Maître de Conférences) at

*Laboratoire Jean Kuntzmann - Université Grenoble Alpes.*

**02/2014 - 08/2014.** I spent six months as **Post-doc** in Shape Optimization at *Università di Pisa*, where I worked on shape optimization [A12,B2] and optimal transport problems [A15].

(For the references [A12], [B2] and [A15], see the complete list of publications.)

**10/2010 - 11/2013.** **PhD** at Scuola Normale Superiore *SNS* and *Université de Savoie*. I won a PhD position at SNS in 2010 and I chose as advisor G. Buttazzo. In 2011 I started working with D. Bucur; a joint supervision agreement between SNS and Université de Savoie was signed in March 2012.

**10/2005 - 10/2010.** I was **Student in Mathematics at SNS** and I graduated with honors: 70/70 cum Laude, Diploma 1235. As every SNS student, I was also a student at the University of Pisa:

- 2008 - 2010. Master in Mathematics - *Università di Pisa* (110/110 cum Laude, Diploma 254324)
- 2005 - 2008. Bachelor in Mathematics - *Università di Pisa* (110/110 cum Laude)

### Honors and awards

**2019.** I am P.I. of the project *ERC Starting Grant VAREG*

**2015.** I won PEDR - *Prime d'Encadrement Doctoral et de Recherche*

**2015.** I was P.I. of the project *VariForm* financed by Université Grenoble Alpes.

**2013.** My PhD Thesis was selected for publication in *Edizioni della Normale*.

### PhD Thesis

Scuola Normale Superiore *SNS* and *Université de Savoie*

Discussed on 8 Nov 2013 in SNS (Pisa, Italy). Mention: 70/70 cum Laude.

Title: **Existence and Regularity Result for Some Shape Optimization Problems**

Published in: Edizioni della Normale, Tesi 19, Springer 2015, ISBN 978-88-7642-526-4

Advisors: Giuseppe *Buttazzo* (Università di Pisa) and Dorin *Bucur* (Université de Savoie)

### Links

**My personal web page:** [www.velichkov.it](http://www.velichkov.it)

**My page on the preprint server CVGMT:** <http://cvgmt.sns.it/person/336/>

**My ArXiv page:** [https://arxiv.org/a/velichkov\\_b\\_1.html](https://arxiv.org/a/velichkov_b_1.html)

**My page at Scopus:** Author ID: 55382990900

**ORCID ID:** <https://orcid.org/0000-0003-4968-3087>

## LIST OF PUBLICATIONS

## Preprints

- [P3] M. Colombo, L. Spolaor, B. Velichkov : *Almost everywhere uniqueness of blow-up limits for the lower dimensional obstacle problem*.  
Preprint CVGMT <http://cvgmt.sns.it/paper/4435/>
- [P2] B. Velichkov : *Regularity of the one-phase free boundaries*. Lecture notes.  
Preprint CVGMT <http://cvgmt.sns.it/paper/4367/>
- [P1] M. Engelstein, L. Spolaor, B. Velichkov : *Uniqueness of the blow-up at isolated singularities for the Alt-Caffarelli functional*. Preprint arXiv:1801.09276

## Journal articles

- [A31] E. Russ, B. Trey, B. Velichkov : *Existence and regularity of optimal shapes for elliptic operators with drift*. Accepted: **Calc. Var. PDE** (Preprint arXiv:1810.07943)
- [A30] M. Colombo, L. Spolaor, B. Velichkov : *On the asymptotic behavior of the solutions to parabolic variational inequalities*. Accepted: **Crelle** (Preprint arXiv:1809.06075)
- [A29] L. Spolaor, B. Trey, B. Velichkov : *Free boundary regularity for a multiphase shape optimization problem*. Accepted: **Comm. PDE** (Preprint arXiv:1810.06963)
- [A28] D. Mazzoleni, S. Terracini, B. Velichkov : *Regularity of the free boundary for the vectorial Bernoulli problem*. Accepted: **Anal. PDE** (Preprint arXiv:1804.09243)
- [A27] M. Colombo, L. Spolaor, B. Velichkov : *Direct epiperimetric inequalities for the thin obstacle problem and applications*. Accepted: **Comm. Pure. Appl. Math.** (Preprint arXiv:1709.03120)
- [A26] M. Engelstein, L. Spolaor, B. Velichkov : *(Log-)epiperimetric inequality and regularity over smooth cones for almost area-minimizing currents*. **Geometry & Topology** (2018).  
<https://msp.org/scripts/coming.php?jpath=gt>
- [A25] I. Fragalà, B. Velichkov : *Serrin-type theorems for triangles*. **Proc. Amer. Math. Soc.** (2018).  
<https://doi.org/10.1090/proc/14352>
- [A24] G. Buttazzo, F. Maestre, B. Velichkov : *Optimal potentials for problems with changing sign data*. **J. Optim. Theory Appl.** 178 (3) (2018), 742–762.
- [A23] M. Colombo, L. Spolaor, B. Velichkov : *A logarithmic epiperimetric inequality for the obstacle problem*. **Geom. Funct. Anal.** 28 (4) (2018), 1029–1061.
- [A22] G. Buttazzo, B. Velichkov : *A shape optimal control problem with changing sign data*. **SIAM J. Math. Anal.** 50 (3) (2018), 2608–2627.
- [A21] L. Spolaor, B. Velichkov : *An epiperimetric inequality for the regularity of some free boundary problems: the 2-dimensional case*. **Comm. Pure. Appl. Math.** 72 (2) (2018), 375–421.
- [A20] G. De Philippis, J. Lamboley, M. Pierre, B. Velichkov : *Regularity of minimizers of shape optimization problems involving perimeter*. **J. Math. Pure. Appl.** 109 (2018), 147–181.
- [A19] D. Bucur, I. Fragalà, B. Velichkov, G. Verzini : *On the honeycomb conjecture for a class of minimal convex partitions*. **Trans. Amer. Math. Soc.** 370 (10) (2018), 7149–7179.
- [A18] D. Mazzoleni, S. Terracini, B. Velichkov : *Regularity of the optimal sets for some spectral functionals*. **Geom. Funct. Anal.** 27 (2017), 373–426.
- [A17] A. Massaccesi, E. Oudet, B. Velichkov : *Numerical Calibration of Steiner trees*. **Appl. Math. Optim.** (2017). <https://doi.org/10.1007/s00245-017-9421-5>
- [A16] J.C. Bellido, G. Buttazzo, B. Velichkov : *Worst-case shape optimization for the Dirichlet energy*. **Nonlinear Analysis** 153 (2017), 117–129.
- [A15] G. De Philippis, A. Meszaros, F. Santambrogio, B. Velichkov : *BV Estimates in Optimal Transportation and Applications*. **Arch. Rat. Mech. Anal.** 219 (2) (2016), 829–860.
- [A14] D. Bucur, D. Mazzoleni, A. Pratelli, B. Velichkov : *Lipschitz Regularity of the Eigenfunctions on Optimal Domains*. **Arch. Rat. Mech. Anal.** 216 (2015), 117–151.

- [A13] L. Brasco, G. De Philippis, B. Velichkov : *Faber-Krahn inequalities in sharp quantitative form*. **Duke Math. J.** 164 (9) (2015), 1777–1831.
- [A12] G. Buttazzo, E. Oudet, B. Velichkov : *A free boundary problem arising in PDE optimization*. **Calc. Var. PDE** 54 (4) (2015), 3829–3856.
- [A11] B. Bogosel, B. Velichkov : *Multiphase Optimization Problems for Eigenvalues: Qualitative Properties and Numerical Results*. **SIAM J. Numer. Anal.** 54 (1) (2015), 210–241.
- [A10] D. Bucur, B. Velichkov : *A free boundary approach to shape optimisation problems*. **Phil. Trans. R. Soc. A** 373 (2015).
- [A9] G. De Philippis, B. Velichkov : *Existence and regularity of minimizers for some spectral optimization problems with perimeter constraint*. **Appl. Math. Optim.** 69 (2) (2014), 199–231.
- [A8] G. Buttazzo, B. Ruffini, B. Velichkov : *Spectral optimization problems for metric graphs*. **ESAIM: COCV** 20 (1) (2014) 1–22.
- [A7] B. Velichkov : *A Note on the Monotonicity Formula of Caffarelli-Jerison-Kenig*. **Rend. Lincei Mat. Appl.** 25 (2014), 165–189.
- [A6] G. Buttazzo, A. Gerolin, B. Ruffini, B. Velichkov : *Optimal potentials for Schrödinger operators*. **Journal de l'École Polytechnique** 1 (2014), 71–100.
- [A5] D. Bucur, G. Buttazzo, B. Velichkov : *Spectral Optimization Problems for Potentials and Measures*. **SIAM J. Math. Anal.** 46 (4) (2014), 2956–2986.
- [A4] D. Bucur, B. Velichkov : *Multiphase shape optimization problems*. **SIAM J. Control Optim.** 52 (6) (2014), 3556–3591.
- [A3] G. Buttazzo, B. Velichkov : *Some new problems in spectral optimization*. **Banach Center Publications** 101 (2014), 19–35.
- [A2] D. Bucur, G. Buttazzo, B. Velichkov : *Spectral optimization problems with internal constraint*. **Ann. I. H. Poincaré** 30 (3) (2013), 477–495.
- [A1] G. Buttazzo, B. Velichkov : *Shape optimization problems on metric measure spaces*. **J. Funct. Anal.** 264 (1) (2013), 1–33.

#### Book chapters

- [B4] G. Buttazzo, B. Velichkov : *Spectral optimization problems for Schrödinger operators*. *Shape Optimization and Spectral Theory*, De Gruyter (2017), 325–352.
- [B3] G. Buttazzo, B. Velichkov : *The spectral drop problem*. *Contemporary Mathematics* **666** (2016), 111–135.
- [B2] G. Buttazzo, M. Van Den Berg, B. Velichkov : *Optimization problems involving the first Dirichlet eigenvalue and the torsional rigidity*. *New Trends in Shape Optimization*, Springer (2015), 19–41.
- [B1] V. Georgiev, B. Velichkov : *Decay estimates for the supercritical 3-D Schrödinger equation with rapidly decreasing potential*. *Progr. in Math.* **301** (2012), 145–162.

#### Monographs

- [M1] B. Velichkov : *Existence and regularity results for some shape optimization problems*. Edizioni della Normale, Tesi 19, Springer 2015, ISBN 978-88-7642-526-4.