

Guillem DOMÈNECH

PERSONAL DATA

PROFESSIONAL ADDRESS: Institute for Theoretical Physics, Heidelberg University,
Philosophenweg 16, 69120 Heidelberg, Germany
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EDUCATION

SEPTEMBER 2017 Doctor Course in COSMOLOGY
YITP, The University of Kyoto, Japan
Thesis: “Inflationary Cosmology in Scalar-Tensor Theories”
Advisor: Prof. Misao SASAKI

JULY 2013 Master of Physics in ASTROPHYSICS, PARTICLE PHYSICS AND COSMOLOGY,
The University of Barcelona, Spain
9.6/10 *First Class Honours* | Major: Cosmology and Particle Physics
Thesis: “Canonical Halo Mass Definition and Universal Halo Mass Function”
Advisor: Prof. Eduard SALVADOR-SOLÉ

JUNE 2012 Undergraduate Degree in PHYSICS
The University of Barcelona, Spain
9.1/10 *First Class Honours* | Major: Particle Physics

RESEARCH INTEREST KEYWORDS

General Relativity – Early Universe Physics – Inflation – Modified Gravity – CMB Physics
Cosmological Perturbations – Euclidean Gravity – Dark Matter – Dark Energy

FELLOWSHIPS, SCHOLARSHIPS AND CERTIFICATES

JAN. 2019 Balzan Center for Cosmological Studies Program support for one month visitor.
APR. 2014 Japanese Government Scholarship (MEXT) for Graduate students (Doctor course)
SEPT. 2012 Faculty of Physics Masters Scholarship (Catalunya Caixa)
SEPT. 2008 Undergraduate degree Scholarship (Caixa Manresa)

LANGUAGES

ENGLISH: Fluent
SPANISH: Mother tongue
CATALAN: Mother tongue
JAPANESE: Intermediate Knowledge
GERMAN: Basic Knowledge

COMPUTER SKILLS

Basic Knowledge: LINUX, R
Intermediate Knowledge: L^AT_EX, Python, Mathematica, Fortran, Excel, Word, PowerPoint

OTHER EXPERIENCES

- Refereeing:** Co-refereed 6 papers and refereed 5 papers for JCAP.
Refereed 2 papers for Physics of the Dark Universe.
- Teaching:** Tutoring for Advanced Quantum Field Theory course in Heidelberg University
Summer Semester 2019. Prof. Wetterich.
Co-coordinator of the Cosmology course in Heidelberg University
Winter Semester 2018. Prof. Amendola.
Co-coordinator of the General Relativity course in Heidelberg University
Summer Semester 2018. Prof. Amendola.
Tutoring for Theoretical Statistical Physics course in Heidelberg University
Winter Semester 2017. Prof. Schwarz.
- Chairing sessions:** Gravity and Cosmology 2018, February, YITP, Kyoto University, Japan.
- Seminar organizer:** Cosmology seminar organizer, ITP Heidelberg
Winter semester 2018 and Summer semester 2019.

PUBLICATIONS AND TALKS

JOURNAL ARTICLES

- 2019 | **Lensing anomaly and oscillations in the primordial power spectrum**
arXiv: 1905.04323 .
Domènech, G., & Kamionkoski, M.
- 2018 | **Mimicking features in alternatives to inflation with interacting spectator fields.** Phys.Lett. **B790** (2019) 263-269. arXiv: 1811.08224.
Domènech, G., Rubio, J. & Wons, J.
- | **Gravitational waves from global cosmic strings in quintessential inflation.** JCAP **1902** (2019) 034. arXiv: 1810.11117.
Bettoni, D., Domènech, G., & Rubio, J.
- | **Vacuum birefringence and the Schwinger effect in (3+1) de Sitter.** JCAP **1810** (2018) no.10, 023. arXiv: 1809.08977.
Banyeres, M., Domènech, G., & Garriga, J.
- | **Vector disformal transformation of generalized Proca theory.** Phys.Rev. **D98** (2018) no.6, 064037. arXiv: 1807.06048.
Domènech, G., Mukohyama, S. , Namba, R. & Papadopoulos, V.
- | **Doppelgänger dark energy: modified gravity with non-universal couplings after GW170817.** JCAP **1806** (2018) no.06, 029. arXiv: 1803.06368.
Amendola, L., Bettoni, D., Domènech, G. & Gomes, A.R.
- 2017 | **Hamiltonian approach to 2nd order gauge invariant cosmological perturbations.** Phys. Rev. D **97** (2018) no.2, 023521. arXiv: 1709.09804.
Domènech, G. & Sasaki, M.
- | **Thermal activation of thin-shells in anti-de Sitter black hole spacetime.** JHEP **1707** (2017) 134. arXiv: 1704.04020.
Chen P., Domènech, G., Sasaki, M. & Yeom, D.h.
- | **CMB Scale Dependent Non-Gaussianity from Massive Gravity during Inflation.** JCAP **1705** (2017) no.05, 034. arXiv: 1701.05554.
Domènech, G., Hiramatsu, T., Lin, C., Sasaki, M., Shiraishi, M. & Wang, Y.

- 2016 | **Strongly scale-dependent CMB dipolar asymmetry from super-curvature fluctuations.** JCAP **1612** (2016) no.12, 020. arXiv: 1610.02650.
Byrnes C., Domènech, G., Sasaki, M. & Takahashi T.
- | **Consistency relation and inflaton field redefinition in the delta N formalism.** Phys. Lett. **B769** (2017) 413-417. arXiv: 1606.03343.
Domènech, G., Gong, J.O. & Sasaki, M.
- | **Inflationary Magnetogenesis with Broken Local U(1) Symmetry.** EPL **115** (2016) no.1, 19001. arXiv:1512.01108
Domènech, G., Chunshan, L. & Sasaki, M.
- | **Stationary bubbles and their tunneling channels toward trivial geometry.** JCAP **1604** (2016) no.04, 013. arXiv:1512.00565
Chen, P., Domènech, G., Sasaki, M. & Yeom, D.h.
- 2015 | **Derivative-dependent metric transformation and physical degrees of freedom.** Phys.Rev. **D92** (2015) no.8, 084027. arXiv:1507.05390
Domènech, G., Mukohyama, S., Namba, Ryo. Naruko, A., Saitou, R. & Watanabe, Y.
- | **Cosmological Disformal Invariance.**
JCAP **1510** (2015) no.10, 067. arXiv:1505.00174.
Domènech, G., Naruko, A. & Sasaki, M.
- | **Conformal Frame Dependence of Inflation.**
JCAP **1504** (2015) no.04, 022. arXiv:1501.07699.
Domènech, G., & Sasaki, M.
- 2014 | **Halo mass definition and multiplicity function.**
MNRAS, **439** (2014) no.3, 3156-3167.
Juan, E., Salvador-Solé, E., Domènech, G., & Manrique, A.
- | **Fixing a rigorous formalism for the accurate analytic derivation of halo properties.** MNRAS, **439** (2014) no.1, 719-724
Juan, E., Salvador-Solé, E., Domènech, G., & Manrique, A.

PROCEEDINGS

- | | |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2017 | <p>Inflationary Magnetogenesis with On-shell Local $U(1)$ Symmetry.
 C16-08-03.1. J.Phys.Conf.Ser. 883 (2017) no.1, 012013.
 Domènech, G., Lin, C. & Sasaki, M.</p> |
| 2016 | <p>Conformal frames in cosmology.
 C15-12-14.2. arXiv:1602.06332.
 Domènech, G. & Sasaki, M.</p> <p>Stationary bubbles: information loss paradox?
 C15-12-14.2. arXiv:1602.04969
 Domènech, G. & Sasaki, M.</p> |

CONFERENCE TALKS

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| MAY 2019 | <p>Spring workshop in Gravity and Cosmology. University of Warsaw, Warsaw, Poland.
 Oscillations that mimick weak lensing</p> |
| JULY 2018 | <p>String Pheno 18. University of Warsaw, Warsaw, Poland.
 Dilaton couplings and the late time universe</p> |
| FEBRUARY 2018 | <p>Gravity and Cosmology 2018. YITP, Kyoto University, Japan.
 2nd order gauge invariant tensor modes in cosmology: a Hamiltonian approach.</p> |
| AUGUST 2017 | <p>COSMO-17. University Paris Diderot, Paris, France.
 Scale-dependent non-gaussianity from massive gravity during inflation</p> |
| JANUARY 2017 | <p>Testing Gravity 2017. SFU, Vancouver, Canada.
 Tensor modes produce a scale dependent non-Gaussianity</p> |
| OCTOBER 2016 | <p>Gravitation and the Universe (HGU 2016). VAST, Hanoi, Vietnam.
 δN, Non-Gaussianity and inflaton redefinition</p> <p>Workshop on General Relativity and Gravitation (JGRG26).
 Osaka City University, Osaka, Japan.
 δN, Non-Gaussianity and inflaton redefinition</p> |
| JANUARY 2016 | <p>Mini-Workshop on Cosmology. APCTP, Pohang, Korea.
 Invariance and degrees of freedom after a disformal transformation.</p> |
| DECEMBER 2015 | <p>2nd LeCosPA International Symposium: Everything about Gravity. LeCosPa, Taiwan.
 Stationary bubbles and information loss paradox.</p> <p>Workshop on General Relativity and Gravitation (JGRG25).
 YITP, Kyoto University, Japan.
 Stationary bubbles and information loss paradox.</p> |
| NOVEMBER 2015 | <p>2nd Mini-Workshop on Gravity and Cosmology. IAP, Paris, France.
 Cosmological Disformal Invariance and Conformal Dependence of Inflation.</p> |

DECEMBER 2014 | **Workshop on General Relativity and Gravitation (JGRG24).**
IMPU, Tokyo University, Japan.
Conformal Dependence of Inflation.

OCTOBER 2013 | **IX International Workshop, The Dark Side of the Universe.**
SISSA, Trieste, Italy.
Canonical Halo Mass Definition and Universal Mass Function.

INVITED SEMINARS

2018 | October 4th at **Warsaw University, Warsaw**, Poland.
Schwinger effect in dS: negative conductivity?

2016 | May 5th at **NCTS, Hsinchu**, Taiwan.
Metric transformations: disformal invariance and mimetic symmetries.

| April 25th at **LeCosPa, Taipei**, Taiwan.
Metric transformations: disformal invariance and mimetic symmetries.

2015 | November 17th at **IAP, Paris**, France.
Metric transformations: cosmological disformal invariance and frame “dependence” of inflation

| March 5th at **APTCP, Pohang**, Korea.
Conformal dependence of inflation

OTHER SEMINARS

2018 | November 6th at **ITP, Heidelberg**, Germany.
Schwinger effect in dS: negative conductivity?

2017 | November 15th at **ITP, Heidelberg**, Germany.
Could there be observable effects from the matter frame during inflation?

2016 | September 28th at **UPV-EHU, Bilbao**, Spain.
Scale dependent non-gaussianity and scalar tensor interactions

| September 23rd at **University of Barcelona**, Spain.
Scale dependent non-gaussianity and scalar tensor interactions

2015 | December 4th at **University of Barcelona**, Spain.
Metric transformations: cosmological disformal invariance and frame “dependence” of inflation.

POSTER PRESENTATIONS

JANUARY 2017 | **Testing Gravity 2017.** SFU, Vancouver, Canada.
Tensor modes produce a scale dependent non-Gaussianity

JUNE 2015 | **New Ideas Meet New Experimental Data.**
String Theory & Cosmology. Hong Kong
Conformal Dependence of Inflation.

SCHOOLS – OTHER WORKSHOPS

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| FEBRUARY 2016 | School on Strings and Fields,
Yukawa Institute for Theoretical Physics, Kyoto University, Japan |
| AUGUST 2015 | Summer School on Cosmology and Particle Astrophysics,
RESCEU APCosPA, Japan
Contributed talk: Conformal Dependence of Inflation. |
| MAY 2015 | Molecular type Workshop: Black hole information loss paradox,
Yukawa Institute for Theoretical Physics, Kyoto University, Japan |