

# ANDREA PETRI

<http://apetri.me>

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## EDUCATION

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### **Columbia University, Graduate School of Arts and Sciences**

*August 2011 - May 2017*

PhD. Physics

*May 2017*

M.Phil. Physics

*May 2014*

M.A. Physics

*May 2013*

*Relevant coursework:*

Advanced Programming   Statistical Mechanics   Quantum Mechanics

Physical Cosmology   Classical Fields and Waves   Quantum Field Theory

### **Scuola Normale Superiore, Classe di Scienze, Pisa, Italy**

*September 2006 - July 2011*

M.S. Physics

*July 2011*

B.A. Physics

*June 2009*

## EXPERIENCE

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### **Morgan Stanley - Institutional Equity Division**

June-August 2015, June-August 2016, June-December

2017

*Equity Trading Lab (ETL) desk*

*New York*

- Evaluated performance of non conventional alpha signals: commodity prices, Twitter sentiment, takeover deal predictors
- Analyzed impact of systematic risk exposure on portfolios traded in US equity markets during 2015
- Developed back test and real time analysis software tools to monitor portfolio risk exposure
- Analyzed stock market historical data, with particular focus on US equity market trades from 2009 to 2014
- Developed mathematical models and algorithms for intra-day volume forecasts

### **Software developer**

January 2013 - May 2017

*Columbia University, NY*

- Developed the LensTools Python library, that will prove useful in Weak Gravitational Lensing data analyses, with particular focus on ray-tracing simulations, astrophysical image analysis, data reduction and statistical inferences of model parameters from observations (project URL <http://lenstools.rtf.d.io>)
- Implemented from scratch the client and server side components of a three tier simple database service, using the C language socket API (code repository available on request)

### **Supercomputing**

March 2014 - May 2017

*Columbia University, NY*

- Actively participated in a supercomputing research project on Cosmology from Non-Linear Weak Lensing at the Extreme Science and Engineering Discovery Environment (XSEDE), with more than 1.5 million CPU hours awarded
- Planned, directed and executed the production of a 30TB simulated dataset featuring lensed galaxy catalogs and Dark Matter density maps

### **Research**

June 2012 - May 2017

*Astrophysics – Large Scale Structure of the Universe*

*Columbia University, NY*

- Served as peer reviewer for the American Astronomical Society (AAS) and for the journal Monthly Notices of the Royal Astronomical Society (MNRAS)
- Conducted statistical analysis of Cosmological Large Scale Structure simulated images, with particular emphasis on the development and implementation of new techniques to constrain physical model parameters
- Worked on Cosmic Microwave Background (CMB) data analysis, with particular focus on temperature image reconstruction starting from raw time ordered data (bolometric and pointing)

- Contributed to the development of CMB map-making software, implemented the corrections for pointing and calibration offsets

### Teaching

September 2012 - May 2017

Graduate student instructor

Columbia University, NY

- Designed and taught as co-instructor a Modern Cosmology class aimed at high school students in the Columbia Science Honors Program (SHP)
- Taught several Physics Laboratory introductory courses aimed at pre-medical and engineering track students

## AWARDS

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- Recipient of the Columbia GSAS Joseph C. Pfister Fellowship for academic qualifications and contributions (May 2017)
- Co-recipient of the Allan M. Sachs Teaching Award for contributions to the educational programs in the Columbia University Physics Department (May 2016)
- Bronze medalist, 37th International Physics Olympiad, Singapore (July 2006)

## FIRST AUTHORED PUBLICATIONS

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- *Validity of the Born approximation for beyond-Gaussian weak lensing observables*  
A. Petri, Z. Haiman, M. May, Phys. Rev. D **95**, 123503 (2017)
- *Cosmology with photometric weak lensing surveys: constraints with redshift tomography of convergence peaks and moments*  
A. Petri, M. May, Z. Haiman, Phys. Rev. D **94**, 063534 (2016)
- *Mocking the Weak Lensing universe: the LensTools python computing package*  
A. Petri; Astronomy & Computing, Elsevier, **17**, 73-79 (2016)
- *Sample variance in weak lensing: how many simulations are required?*  
A. Petri, Z.Haiman, M.May; Phys. Rev. D **93**, 063524 (2016)
- *Emulating the CFHTLenS weak lensing data: Cosmological constraints from moments and Minkowski functionals*  
A. Petri, J. Liu, Z.Haiman, M.May, L.Hui, J.M.Kratochvil; Phys. Rev. D **91**, 103511 (2015)
- *Impact of spurious shear on cosmological parameter estimates from weak lensing observables*  
A. Petri, M.May, Z.Haiman, J.M.Kratochvil; Phys. Rev. D **90**, 123015 (2014)
- *Cosmology with Minkowski Functionals and moments of the weak lensing convergence field*  
A. Petri, Z.Haiman, L.Hui, M.May, J.M.Kratochvil; Phys. Rev. D **88**, 123002 (2013)
- *Supermassive black hole ancestors*  
A. Petri, A.Ferrara, R.Salvaterra; Mon. Not. R. Astron. Soc. **422**, 1690-1699 (2012)

## SKILLS

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<b>Mathematical tools</b>	Linear algebra, bayesian statistics, image processing
<b>Programming Languages</b>	Python, C/C++, Fortran90, Bash
<b>Protocols &amp; APIs</b>	Object Oriented Programming, Parallel Computing (MPI), TCP/IP sockets, HTTP
<b>Databases</b>	pandas, Q/KDB, MySQL
<b>Tools</b>	Distributed source control (git, mercurial)
<b>Languages</b>	Italian (native), French (intermediate)

## US SECURITIES LICENSES

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<b>General securities representative</b>	Series 7
<b>Securities trader</b>	Series 57
<b>Uniform securities agent</b>	Series 63