# Dr. Raffaella **Capasso**

Researcher and Data Scientist

## About me

I am passionate about data visualization and problem solving. Through big data processing, I am interested in extracting, understanding, and presenting the meaningful value hidden in data.

- LinkedIn
- Personal Website

## Skills & Strengths

**Programming**

- Data Analysis & Visualization
- Machine learning
- Parallel computing

Python | IDL | C++ |
Fortran | Julia

**Team Development and Agile Project Management**

- Daily stand-up meetings & Project updates
- Regular hack sessions

Keynote | PowerPoint |
Trello | SLACK |
Github | Bitbucket

# EXPERIENCE

- **Project leader** for both small (<5 people) and large (<20 people) teams as part of scientific collaborations, ensuring the completion of milestones and providing regular updates

- **Author and co-author** of 30 publications in peer-reviewed journals

- **Referee** for publications in leading physics journals (MNRAS, ApJ)

- **Speaker** at more than 20 national and international conferences, with full financial support

10.2021 - today **Scientific Researcher |** ∂ **Advisor: Prof. Daniel Grün**

**Ludwig-Maximilians-Universität, Munich, Germany**

As a member of the **astrophysics, cosmology, and artificial intelligence** group at the LMU, I apply precise and accurate machine learning techniques to advance the future of physics research. **Main duties and accomplishments**:

- Leader on a project based on a **VAE-GAN infrastructure**, aiming at creating a physical model of clusters of galaxies

- Organizer of the **"Generative Models Seminar"**

- Teaching assistant for python-based labs and astrophysical lectures

**10.2019 - 09.2021**   **Scientific Researcher |** 🔗 **Advisor: Prof. Jens Jasche**
📍 **University of Stockholm, Sweden**

Application of advanced statistical methods, such as **machine learning**, to big astrophysical datasets to compare models with the observed Universe. **Main duties and accomplishments**:

- Improved the accuracy of standard contamination removal codes by 30% by means of **supervised machine learning techniques**
- Built a **Generative Adversarial Network** for fast generation of realistic galaxy images
- 🖥 Active member of the **Aquila Consortium**, focusing on using information theory and artificial intelligence to optimally extract physical information from data
- Organizer of the 📅 **"Stockholm Data Science Forum"** and of the 📅 "Cosmology and Gravity" seminar series
- **Supervisor** of more than 3 Master/PhD students, supporting them to achieve both goal and deadline driven results

**06 - 09.2019**   **Postdoctoral researcher |** 🔗 **Advisor: Prof. Alexandro Saro**
📍 **INAF - Osservatorio Astronomico di Trieste, Italy**

**Main duties**: Large scale data analysis and modelling, using more than one million simulated galaxies to assess the systematics associated to the measurement of dynamical cluster masses

**05.2019**   **Research visit |1 month, with Prof. Katherine Freese**
📍 **Leinweber Center for Theoretical Physics (LCTP, University of Michigan), Ann Arbor, USA**

**02.2019**   **Data Science ZEISS Hackathon**
📍 **ZEISS Digital Innovation Partners, Munich, Germany**

**12.2017**   **Observer for the Dark Energy Survey |** ⭐ **5 nights**
📍 **Blanco Telescope (4m), Cerro Tololo Inter-American Observatory, Chile**

**Main duties**: On-site monitoring of data taking for the Dark Energy Survey and optical imaging

# SPECIALIZATION COURSES

**02 - 04.2020**  **Machine Learning course |** by Andrew Ng

📍 **Coursera**

A broad introduction to **machine learning and datamining**.Topics included: supervised and unsupervised learning, best practices in machine learning, and **numerous case studies and applications**, including text recognition, computer vision, medical informatics, audio and database mining.

# EDUCATION

**02.2015 - 04.2019**  **PhD |** 🔗 **magna cum laude,** Advisor: Prof. Joseph Mohr

📍 **Ludwig-Maximilians-Universität, Munich, Germany**

Thesis: "Galaxy Clusters: a Dynamical Perspective"

**Main duties** included:
- Exploitation of **analytical and numerical tools** to analyze the phase-space distribution of gravitationally interacting N-body systems
- Development of a **fully (MPI-) parallel Python code** based on the Jeans analysis, employing a self-consistent **Bayesian model averaging procedure**
- **Tutoring** of Bachelor/Master/PhD students
- 🔗 **Organization** of the 1st Student Symposium "IMPRS talks to you" at the "International Max Planck Research Schools" on Astrophysics and of the "Clusters Journal Club"

**10.2012 - 12.2014**  **Master Degree in Astrophysics and Cosmology |** Advisor: Prof. Lauro Moscardini

📍 **University of Bologna "Alma Mater Studiorum", Bologna, Italy**

Thesis: "The gas mass fraction and the dynamical state of X-ray luminous clusters of galaxies at low redshift"

**Main duties** included being a tutor and a referee for Bachelor/Master students, liaison between students and professors, learning support when needed

**09.2009 - 09.2012**  **Bachelor Degree in Astronomy |** Advisor: Prof. Daniele Dallacasa

📍 **University of Bologna "Alma Mater Studiorum", Bologna, Italy**

Thesis: "Scattering processes in Astrophysics"

# REFERENCES

**Dr. Ben Hoyle** | **Carl ZEISS, Munich**

Senior Data Scientist and Algorithms Engineer

(Contact details upon request)

**Prof. Dr. Jens Jasche** | **Stockholms universitet**

Professor and Data Scientist

(Contact details upon request)

**Prof. Dr. Alexandro Saro** | **INAF - Osservatorio Astronomico di Trieste**

Professor and Data Scientist

(Contact details upon request)

*Raffaella Capasso*

München, March 18, 2022