Ricky Nilsson

Astronomer
Exoplanet Research Scientist

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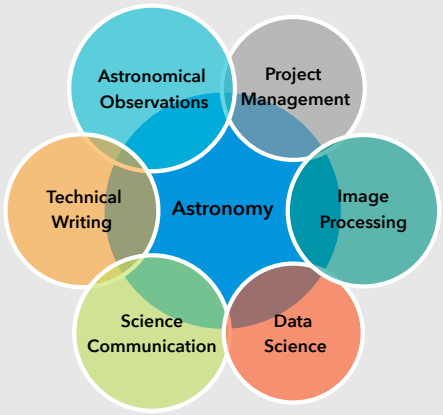
Skills

Overview



Focus: image processing and analysis – spatial/spectral/temporal modeling and classification of data – pattern recognition and feature extraction – pipeline automation – machine learning – statistics

Programming

Basic → *Advanced*

MATLAB • LaTeX

Python • Git • Wordpress

HTML & CSS • SQL • BASH

LabVIEW • R • Java

Languages

Basic → *Advanced*

Swedish • English

German

Experience

10/2015–Present **Postdoctoral Research Associate in Astronomy** Caltech, Pasadena, CA, USA

- Project Manager for *WIRC+Pol* and *Project 1640* (cross-institutional teams of ~10 engineers and scientists), leading and overseeing all aspects of the instrument projects and near-infrared observational surveys
- Perform target selection, astronomical observations, data processing, scientific modeling and analysis using MATLAB and Python (NumPy, SciPy, pandas, Astropy, matplotlib, scikit-image, IPython, Jupyter), and author papers and proposals on multiple projects for high-contrast coronagraphic imaging, spectroscopy, and polarimetry of exoplanets and brown dwarfs
- Responsible for processing direct imaging data with *S4*, a data-driven machine learning algorithm for PCA modeling and removal of speckle noise
- Developed Python code for automatic identification of source spectra in spectro-polarimetric images, enabling fast bulk extraction with ~100x increase in pipeline efficiency

09/2012–09/2015 **Postdoctoral Research Fellow in Astrophysics** AMNH, New York, NY, USA
Swedish Research Council (VR) International Postdoc Fellow

- Performed observations, data processing, analysis, and wrote papers for direct imaging and spectroscopy of exoplanets with *Project 1640*
- Responsible for processing of data; designed and wrote an object detection and tracking code for precision image alignment within data cubes to correct for atmospheric and instrument-induced dispersion (saving $120k on a hardware ADC), as well as an automated planet detection code for high-contrast images

05/2012–08/2012 **Postdoctoral Researcher in Astronomy** Stockholm University, Sweden

- Modelled gas production mechanisms in circumstellar debris disks from spatially resolved disk images in emitted and scattered light

07/2010–03/2011 **Research Student / Support Astronomer** NOT, Santa Cruz de La Palma, Spain

- Studentship (during Ph.D. program) combining research activities and observational support for optical and near-infrared observations with various instruments at the 2.6-m Nordic Optical Telescope (NOT)
- Mounted instruments, introduced and assisted visiting astronomers in the use of the telescope and instruments, performed service- and technical observations, calibrated data, and wrote code for data analysis

04/2005–06/2006 **Research Student** Lund Observatory, Sweden

- Investigated the scientific potential of high-speed quantum optical measurement methods with future extremely large optical telescopes using APD detectors and photon-counting hardware correlators
- Simulated autocorrelation measurements of the Crab pulsar, demonstrating sensitivity to 1000 times faster variability than currently observable

Education

08/2006–04/2012 **Ph.D. in Astronomy** Stockholm University, Sweden
Stockholm Astrobiology Graduate School

- Completed 1.5 years of graduate level courses
- Researched circumstellar disks and planet formation, with main projects involving optical- and submillimeter observations of debris disks
- Processed and analyzed data from optical coronagraphic polarimetry (NOT/PolCor), integral-field spectroscopy (VLT/FLAMES), and submillimeter arrays (APEX/LABOCA)
- Dissertation: *"Circumstellar Debris Disks: Observational Studies of Cold Dust and Gas Emission in Planetary Nurseries"*

09/1999–04/2005 **M.Sc. in Engineering Physics** Lund Institute of Technology, Sweden

- Specialization: Astronomy & Astrophysics, Atomic Physics & Spectroscopy, Laser Physics & Optics
- Thesis: *"High-Speed Astrophysics: Chasing Neutron-Star Oscillations"*