

Dr. Jack Hickish

Real-Time Radio Systems Ltd

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EDUCATION

Department of Astrophysics, University of Oxford

D.Phil (PhD)

Oxford, UK

Completed 2014, Awarded 2015

Balliol College, University of Oxford

Master of Physics (1st Class)

Oxford, UK

Completed 2009

EMPLOYMENT

Real-Time Radio Systems Ltd.

Director

Christchurch, UK

2016 – present

Radio Astronomy Laboratory, UC Berkeley

Assistant Researcher

Berkeley, CA

2016 – Dec 2019

Space Science Laboratory, UC Berkeley

Visiting Research Scholar (50% time)

Berkeley, CA

2013 – 2015

Cavendish Laboratory, University of Cambridge

Post-doctoral Research Associate (50% time)

Cambridge, UK

2013 – 2015

EXPERIENCE

Digital Signal Processing Systems Design Consultant

Real-Time Radio Systems Ltd

- Digital Systems Lead for the California Institute of Technology's Long Wavelength Array 352-antenna upgrade. Designed mixed platform (FPGA + GPU) radio-astronomy correlator/beamformer.
- FPGA Systems Lead for the SETI Institute's COSMIC project. Implementing a multi-Tbit/s Ethernet data processing system to feed data from the Very Large Array (VLA) into a CPU/GPU compute cluster.
- Development of novel RADAR signal processing pipelines using FPGA prototyping platforms.

Correlator design & FPGA toolflow development

Radio Astronomy Laboratory, UC Berkeley

Jan 2016 – Dec 2019

- Lead role in design and implementation of real-time digital signal processing for the HERA telescope.
- Core developer in the Collaboration for Astronomy Signal Processing and Electronics Research (CASPER), developing programming tools for the latest generation of FPGA-based processing platforms.

Digital Signal Processing Methods for Large-N, Low-Frequency Radio Telescopes

Cavendish Laboratory, University of Cambridge

2013–2015

- Lead role in design and implementation of an FPGA-based digital correlator for the AMI array.
- Part of the University of Cambridge Square Kilometre Array group, providing input into the design of the Square Kilometre Array.

- Authored new CASPER toolflow to target next-generation Xilinx FPGAs via a MATLAB/Simulink design interface.

D.Phil Thesis – Digital signal processing in large, multi-element radio telescopes

Department of Astrophysics, University of Oxford 2009 – 2013 (Examined 2014, Awarded 2015)
(Supervisors: Prof. Mike Jones, Dr Kristian Zarb Adami)

- Development of digital signal processing systems – including spectrometers, correlators and beamformers – for current and future radio telescopes.
- Development of innovative architectures to increase the performance and efficiency of digital radio-astronomy instruments.
- 400% efficiency increase of CASPER correlator module.

Master’s Project – Phase & amplitude calibration of radio arrays using FPGAs

Department of Astrophysics, University of Oxford 2009
(Supervisor: Dr Kristian Zarb Adami)

- Designed, simulated and implemented a radio telescope phase and amplitude calibration system on an FPGA platform, using Matlab and Simulink environments with Xilinx System Generator.

TECHNICAL SKILLS

FPGA Design

- Experienced programmer in VHDL & Verilog. Experienced user of Matlab Simulink & Xilinx System Generator for FPGA design and simulation. Lead developer of CASPER FPGA design toolflow.

Software

- Experienced with Python, Matlab, C. Familiar with targeting GPU platforms.

Computing & Networking

- Familiar with GNU/Linux, Ethernet / basic networking protocols, high-speed UDP/IP data transport systems.

DSP Applications

- Designer of both large N (350 antennas) and large B (5 GHz bandwidth) radio astronomy correlators and beamformers.