



# EQUS

Australian Research Council  
Centre of Excellence for  
Engineered Quantum Systems

## Translational Research Program

# REDBACK SYSTEMS RS40k ECHELLE SPECTROMETER

### Key Benefits:

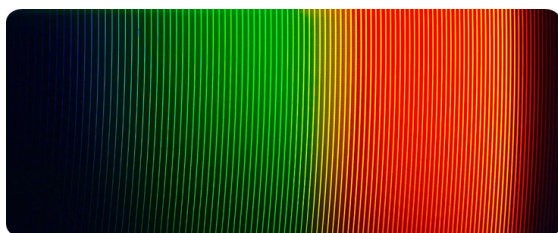
- Compact and robust design
- $R \sim 40,000$  resolving power
- 400-950nm simultaneous coverage
- High efficiency

### Background

The project originated from the application of spectrometer technology originally developed for exoplanet search in a quantum technologies laboratory. Echelle spectrometer technology was, for the most part, unknown to quantum technology experts. When researchers from other institutions were visiting our quantum technologies lab they started to ask 'where can I get one?'. This triggered the start of our startup endeavour.

### Technology

A conventional spectrometer will use a single dispersive element to separate the incident light in one direction (using only a small part of a detector chip). By introducing a second, cross-dispersive element the light can be further spectrally separated and fall upon thereby make use of a full 2-dimensional detector chip.



Drawing upon the existing expertise in our team, we have been able to engineer a compact and robust echelle spectrometer. The spectrometer footprint is significantly reduced in comparison to comparable devices on the market, and the design enables plug-and-play functionality in the lab.



Throughout the design process the goal of supporting quantum technologies has remained paramount. We focus on the efficient detection of photons, and with such a large spectral range to acquire over the maximum amount of information can be extracted.

### Translation project

The translation project has successfully seen the development of a research project through to a commercial product. A spin-off company, Redback Systems (RBS), has been created and has licenced the intellectual property (IP) from Macquarie University. RBS is now

delivering spectrometers to customers across the globe.

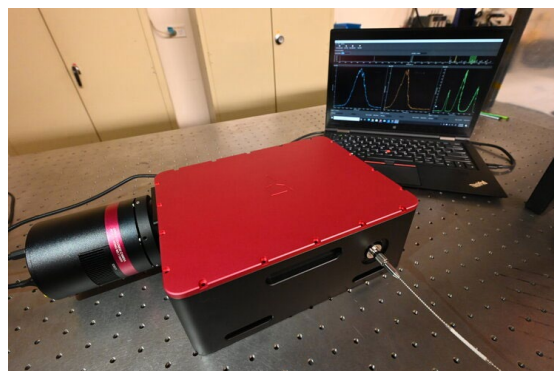
The project and team progress was greatly accelerated via CSIRO's ON Prime and ON Accelerate innovation programs, and notably Dr Matt van Breugel has been awarded the Stanford Australia Foundation - CSIRO Scholarship to attend the Stanford Graduate School of Business.



The project included customer discovery, with over 100 interactions with potential end users influencing the design process. Many prototypes were developed, with the team adopting and embracing lean startup principles.

### Outcomes

The EQUUS TRL program has, unquestionably, enabled the translation of our technology from the lab into the real-world. Redback Systems now sells this device as its first commercial product, and interest is continuing to grow in academic and non-academic sectors.



Redback Systems featured in CSIRO's Growing Australia's Quantum Technology Industry report in 2020. Our company was highlighted as a quantum enabling technology.

### Future opportunities

Redback Systems will continue to grow as an optical engineering company, with particular focus on the emerging quantum industry.

### Team

- **Dr Matt van Breugel** - Chief Executive Officer
- **Dr Tobias Feger** - Chief Technology Officer
- **Dr Lachlan Rogers** - Chief Scientific Officer
- **A/Prof Thomas Volz** - Strategic Partnerships Manager
- **Dr Christian Schwab** - Spectrometer Specialist
- **Prof David Coutts** - Applications Specialist

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