Electron Spin Resonance (ESR) Instrumentation and Applications

StAnD-ESR

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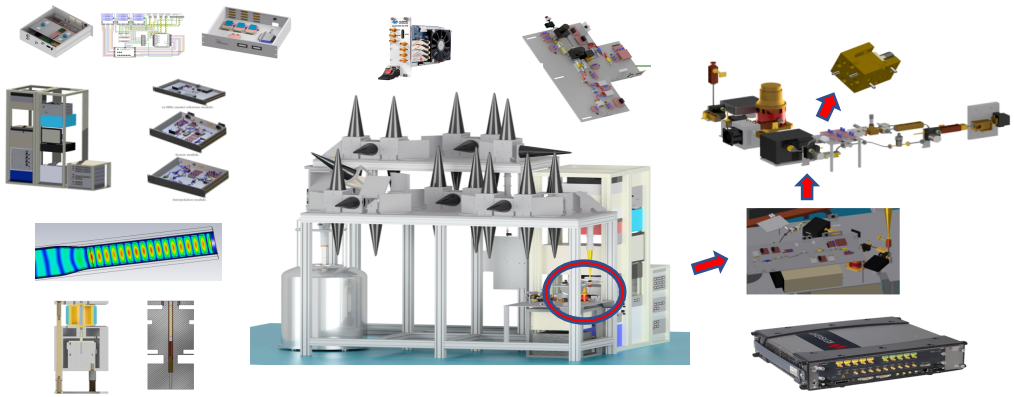
Abstract

Electron Spin Resonance is the study of free radicals, spin labels, transition metals, paramagnetic defects and other systems with unpaired electrons. Scotland has now one of the leading centres in the world in ESR, with state-of-the-art home-built and commercial instrumentation and one of the largest concentrations of active Principal Investigators, working in areas such as catalysis, molecular biology, electronic devices and solid state physics.

State–of-the-art High Power 94 GHz Pulsed ESR Spectrometer (HIPER) - with selected key components



Project Description

StAnD-ESR is a major multi-disciplinary collaboration between St Andrews and Dundee Universities that brings together engineers, physicists, chemists and molecular biologists. The centre developed 18 years ago from a UK National facility, and has some of the best commercial and home-built pulsed ESR instrumentation in the world, all shared within the group. It was the first centre in the UK to initiate a pulsed ESR program using modern commercial equipment and has a track record of developing state-of-the-art instrumentation. The group has numerous National and International collaborations covering a broad range of applications, although a particular focus within the group has been on long range structural studies in molecular biology, based on dipolar spectroscopies using spin labels.

Key Facilities / Instrumentation

- Major centre for EPR instrumentation, component and methodology development, linked to multiple application areas
- Suite of modern commercial pulsed EPR instruments (recently upgraded)
- Recent (HIPER) EPSRC instrumentation grant is poised to improve current state-of-the-art sensitivity by more than an order of magnitude
- Instrument development has fed into multiple radar programs
- Commercial partner (TK Ltd) has sold ESR instruments and components around the world and was awarded Queens Award for Industry in 2011
- Two systems sold to two US National labs

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