

RIKEN – RAL Muon Facility

An international collaboration on muon science

The RIKEN-RAL Muon Facility was constructed at ISIS by RIKEN as part of a 10-year partnership agreement signed in 1990. The facility consists of four experimental areas for muon science, as well as a primary muon beamline, and is unique in Europe.

First RIKEN-RAL agreement signed



Construction begins

1990

Inauguration of the facility and the RIKEN office at RAL

Construction complete

First muon-catalysed fusion experiments

First condensed matter studies



First muons

Polaron motion in conducting polymers measured for the first time and published in *Phys Rev Lett*

Second RIKEN-RAL agreement signed



Agreement for addition of Port 4 signed

2000

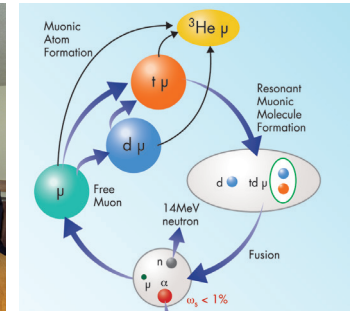
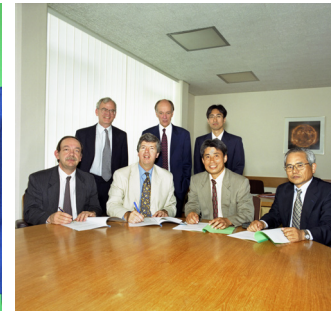
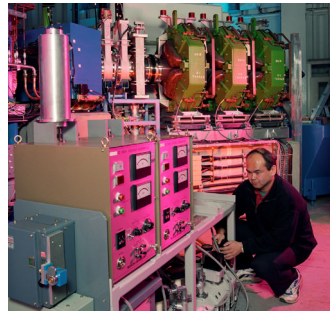
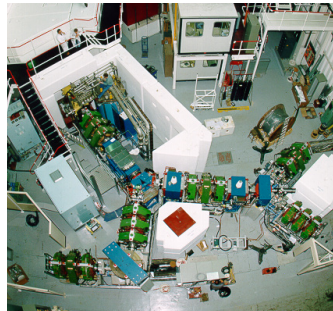
Temperature dependence in muon-catalysed fusion studied and published in *Phys Rev Lett*

Observation of first low-energy muon beam produced by laser ionisation

Establishment of the RIKEN Nishina Centre and incorporation of the RIKEN-RAL Muon Facility

First RIKEN-RAL International Advisory Committee held at RAL

Spin diffusion in 1D chains published in *Phys Rev Lett*



The RIKEN-RAL agreement was renewed in 2000, 2010 and 2018 – in total, 33 years of continuous collaboration and a hugely successful international scientific partnership.

Third RIKEN-RAL agreement signed



Completion of the CHRONUS spectrometer

2010

Coexistence of magnetism and superconductivity found in Fe-based superconductors and published in *Phys Rev Lett*

Diffusion rate of ions in battery material quantitatively measured in collaboration with Toyota Research and published in *Phys Rev Lett*

Measurement of the state-selected reaction of muonium with vibrationally-excited H_2 published in *J Phys Chem Lett*

Magnetic and non-magnetic phases of a quantum spin liquid published in *Nature*

25 years of RIKEN-RAL



Measurement of muon-induced single event upsets in memory elements

Development of elemental analysis using negative muons

Fourth RIKEN-RAL agreement signed



30 years of RIKEN-RAL



2020

Demonstration of ferromagnetic fluctuations in heavily overdoped $(Bi, Pb)_2Sr_2CuO_{6+x}$ copper oxides published in *Phys Rev Lett*

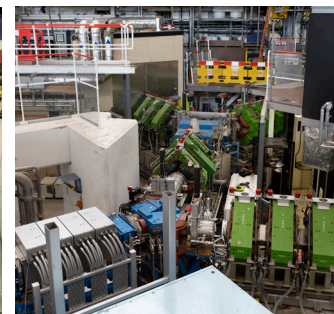
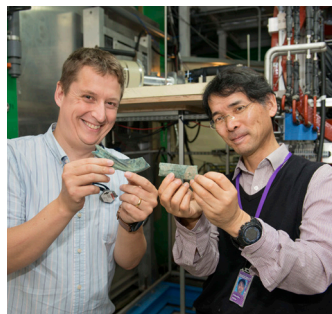
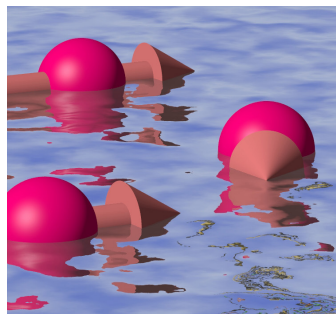
Hypoxia measurements using muonium published in *NIM A*

Refurbishment of the facility, enabling it to run for many more years

Closure of the RIKEN office at RAL



Signing of an MoU between the RIKEN Nishina Centre and ISIS for continued cooperation



1990
2023

Over 30 years of UK–Japan partnership



Over 800 submitted proposals
(580 from Japanese researchers)



2500 days of experiments



More than 500 publications



Collaborations with
> 90 institutes across Japan



Collaborations with
> 50 institutes worldwide



Agreements with Malaysian,
Indonesian and Korean institutes



Condensed matter, molecular and chemical studies

Muon-catalysed fusion

Low-energy muon generation

Muon technique development

Fundamental muon and nuclear physics investigations

Elemental analysis

