

# UK physics 'must focus on breakthroughs'

[LONDON] Physics and astronomy research in Britain should concentrate its resources on areas with the potential to create significant scientific breakthroughs, rather than distributing them more widely, suggests the incoming chief executive of Britain's Particle Physics and Astronomy Research Council (PPARC).

Ian Halliday, professor of physics at the University of Wales, Swansea, argues that years of budget cuts mean that scientists tend to opt for the security of well-trodden ideas. He wants this to change, and is willing to fund riskier projects if there is a chance of a major advance. "This is an invitation not to do the standard thing," he says.

Halliday, a particle physicist and former chairman of an *ad hoc* PPARC committee that looked into privatizing the management of Britain's royal observatories, says it is time that Britain won a Nobel prize for physics. (The last Briton to receive the physics prize was Sir Nevill Mott in 1977.)

He singles out two areas in which he feels that important breakthroughs, perhaps even a Nobel prize, are possible: gravitational waves — the bursts of waves in space produced by violent astrophysical events such as collapsing stars, predicted by Einstein's theory of general relativity — and the search for the missing 'dark matter'.

Members of research groups working on these two topics appear excited by Halliday's interest, although they are a little wary as they have not been PPARC's priorities in the past. Neil Spooner, a PPARC fellow at the University of Sheffield, which belongs to the UK Dark Matter Collaboration Project,



Halliday: keen to target resources on 'risky' projects where a Nobel prize might be won.

points out that PPARC's failure to maintain funding in previous years has set the group back, while groups overseas are investing much more heavily in dark-matter detectors.

The British dark-matter group is trying to establish whether weakly interacting massive particles (WIMPs) are a source of the missing mass. Effective detectors need to be massive and situated underground to exclude natural background radiation.

Spooner says PPARC's lack of interest has meant that the British group can afford only a 5-kg detector housed in a Yorkshire mine provided free of charge by the mine's owners. By contrast, a group at the University of California at Berkeley and Stanford University has access to a special cryogenic detector, and a group at the University of Rome is building a 250-kg detector.

PPARC's funding of British research into gravitational waves tells a similar story. The

University of Glasgow is a "world-leading" group, says Norna Robertson, reader in physics and astronomy. She says gravitational waves need long and highly sensitive detectors, ideally several kilometres in length, but Glasgow's detector is just 10 metres long.

The university is now building a part-PPARC-funded, 600-metre detector in Germany with the University of Hanover and the Max Planck Institute in Garching. But other groups have better equipment. A separate collaboration between Caltech and the Massachusetts Institute of Technology will result in two separate 4-km detectors at Hanford, in Washington state, and in Louisiana. And a French/Italian collaboration is building a 3-km detector near Pisa in Italy.

Halliday recognizes that both fields are highly competitive. But he believes it is still not too late for Britain's physicists to make significant progress, although creative thinking and a willingness to take intellectual risks are required. He says that a similar approach is needed for Britain's contribution at the European Laboratory for Particle Physics (CERN) in Geneva.

Until 2005, most of Britain's particle physics budget is committed to work at CERN. Indeed, two weeks ago, PPARC's governing council set aside £104 million (US\$173 million) for 16 British research groups to help build two detectors for the Large Hadron Collider (LHC), now under construction.

Halliday says he is committed to the LHC, and does not want to convey the impression of being an adversary. But he does not want British physicists to be "so busy building equipment" for the collider that they are unprepared for analysing "the new and exciting physics" expected to emerge once it begins to generate results.

Some physicists endorse his approach. Roger Cashmore, chairman of the University of Oxford's physics department, agrees that particle physicists in Britain will at some stage "need to move into analysis mode", but that this will be difficult while attention is focused on building the LHC detectors.

Others are more sceptical. John Ellis, a senior theoretical physicist at CERN, says it is hardly fair for Britain's physicists to "twiddle their thumbs" while the LHC detectors are being built, and then to "come in, do the analysis and walk off with the prize."

According to Halliday, "the [collider] is a major PPARC project. It will discover the Higgs particle, and the intellectual and experimental leaders will get Nobel prizes". He also accepts that most particle physics will be done at CERN for the next 15–20 years. "It is important for the future of particle physics that PPARC assists UK physicists to attain those roles."

## Britain opens up science advisory panel

[LONDON] A move by the British government to revive its senior advisory panel on research policy has been welcomed by science policy experts, who hope the revamped panel will improve on its previously moribund performance.

Margaret Beckett, president of the Board of Trade, announced last week that the Council for Science and Technology will be reconstituted with a large independent membership of 14 and a broad but clearly defined mandate. It will be chaired by Beckett, with Sir Robert May, the government's chief scientific adviser, serving as deputy chair.

The new mandate requires the council to advise the prime minister on strategic matters, such as the international benchmarking of UK research and the implications of public spending plans. The council will publish an annual report, and will "normally" publish its advice to the

government; the old council did not publish its work, and its members were not even publicly identified.

John Mulvey, director of the pressure group Save British Science, says his group welcomes the changes: "It looks likely to be a much more effective body than the previous council."

But others point out that the proposed reform falls short of a proposal made last year by the Dearing Commission on Higher Education for a new body, with an independent chair, to advise on research policy. They also suggest that a panel headed by Beckett may carry little weight outside her department.

In a separate move, the House of Commons Select Committee on Science and Technology, chaired by Michael Clark, is gathering evidence for an inquiry into the UK science advisory system which it plans to complete by the autumn. **Colin Macilwain**