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Open Letter to all research groups in Quantum information, quantum optics, atom optics.

Dear Colleagues,

We would like to inform you about the plans within ACQAO to continue as a Centre of Excellence (COE). We are still in the early stages of defining the details of a future COE in a broadly similar area but with a new mix of physics and new goals. If you are interested in potentially joining us then we would encourage you to respond to this letter so that we can involve you in future discussions on ideas for scientific goals and any overlap with other plans for COEs.

We have been very successful in demonstrating the capability of COEs and I outline below the special features of the ACQAO model. While no direct guidelines are available it is now a good time to look at the options for the future. We are discussing this in our Centre right now and at our ACQAO workshop in Lorne in November. The AIP congress will be the next opportunity to hold a discussion with all interested parties, and we will be in touch about meeting there - possibly during one of the lunch breaks.

Together we need to find a way to address the important questions: How to select a science theme? How to include the most relevant Australian talent?

The combination of quantum and atom optics is still an excellent theme. However, our goals and technologies are evolving. Quantum information has grown immensely and there are many new groups in Australia and in other countries. The attached diagram compares the strength of these fields in 2002 and 2008. The global activity in our research field has expanded similarly. It is now a major topic in the EU, USA and a growth area in Asia. We also have the first examples of technical applications and companies, in particular Quantum Key Distribution. While the demand for quantum technology has increased we also compete with other urgent themes in science (climate change, water & environment, and security).

The research field now includes 30 - 40 Australian groups (see attached diagram for an overview) and ideally could contain 3 COEs of the present size. The themes of these COEs have to be demonstrably different while sharing the same motivation for fundamental research towards future quantum technologies. This whole package has to be sold to a panel of experts that will represent all aspects of science, and our goal might be to get 2 - 3 out of about 20 or so future COEs. That means we need proposals that are strong but not overlapping with each other.

How to select National COEs?

Each COE is regarded as a national team (think Wallabies) that represent the best people in the Country in this field. While it would be easy to build COEs around local strengths they will have to have strong nodes in different states.

How to select the leadership?

We need a group of leaders for each COE that have the necessary strong science track record, management skills and visibility to make a Centre successful. Several people can do this together - but one person has to lead, working full time as Director and be responsible to the ARC.



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Please let me summarize the strengths of ACQAO as a model for a future Centre of Excellence:

**(1) Track record:**

ACQAO has been an excellent demonstration that a COE can produce more results than the individual project. In 2002 we defined our theme as the overlap between quantum-optics and atom-optics, this defined one of the most active areas in physics. By forming a theory core and working on six parallel projects we have not only achieved all the individual research goals but also created collaborations that previously did not exist. Our collaborative approach of involving all CIs has helped us to simultaneously focus on our goals and remain flexible to incorporate new trends and ideas into our research.

We have been and should remain a Centre that works in fundamental science - with a clear strategic goal for helping to create future quantum technologies.

**(2) Management and leadership:**

ACQAO has an excellent management model. The experimental projects are funded well enough to achieve internationally competitive results. There is sufficient autonomy in the projects to make technical decisions fast and effectively. At the same time we have a focused and active leadership, both in terms of science and in financial and personnel management. We have a clear process of setting as a team directions for the whole Centre, and a very effective internal administration that delivers clear outcomes.

The ARC has applauded these management attributes, indicating that ACQAO has been a model case for smooth operation from their point of view. From the Researchers and Students perspective it has minimized and streamlined the administrative workload typically found in individually funded projects.

**(3) International recognition:**

ACQAO has created a well-known name that is strongly recognized by our international collaborators (evidence: discussions on conferences, invitations, sought after partner for other Centres, in particular in Europe). We have achieved this by carefully cultivating our links, setting up partnerships, hosting impressive and productive conferences and student workshops, finding influential supporters and impressing our colleagues with the quality of our results and the effectiveness of our Centre.

All this could be very beneficial in the next COE round where considerable emphasis will be given to international collaborations.

**(4) Research Training:**

ACQAO has a strong emphasis on research training and we can be very proud of the graduates and young researchers who gained their skills in our Centre. We are now a team that many students want to join. We created many opportunities for our young colleagues to form their own networks (for example through our international student workshops) and provide opportunities for international exchange.

Finally ACQAO has played a role in supporting the entire research field and ensuring that one COE does not monopolize a research field. This includes inviting our non-ACQAO colleagues in the field to our workshops, summer schools and conferences.

It would appear very strange to the ARC or our partners if a Centre as successful as ACQAO would not want to continue and reinvent itself. For all of these reasons stated above we believe it is desirable to use ACQAO as a model to the future.

Best regards,



Hans

