

AIP award winner explores the quantum limit.

Article by Ben Villani

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Professor Hans Bachor from the Australian National University has been awarded the Australian Institute of Physics *Award for Outstanding Services to Physics in Australia*. Professor Brian James, President of the Australian Institute of Physics (AIP), presented the award at a ceremony held at the ANU on Thursday the 29th of October.

Professor Bachor is a specialist in the quantum behaviour of atoms and light. He has spent much of his career researching, experimenting and lecturing at the ANU where he has held the position of ANU professor since 1996 and was head of the Department of Physics between 1996 and 2001. He is currently the Director of the Australian Research Council Centre of Excellence for Quantum-Atom Optics (ACQAO).

The AIP President Professor James said that when considering Professor Bachor for this award, the executive “had no trouble very quickly realizing that it was highly deserved... His research achievements are outstanding, but that’s not the only reason for this award ... Hans has managed to maintain a passionate commitment to teaching and is well known for his inspiring lectures... His activities in relation to teaching alone would merit the award”.

Professor Bachor said, “It’s pretty humbling to get such a prize and to be in the footsteps of, let’s say, Mike Gore - who set up Questacon...or Rod Jory who set up the National Youth Science Forum. That’s a pretty good feeling”. At the ceremony Professor Bachor gave a short presentation describing some of his work and explaining why he loves to do it.

“Why do we actually do physics? Well, I think it’s fun. We wouldn’t do it without enjoying it. It’s a challenge. We want to do something that is new. I think it becomes an addiction. It’s more than just a habit. And I think it is also extremely useful. That makes me proud of actually doing this.”

Professor Bachor’s name is attached to over 150 articles that have been published in refereed journals and he holds an array of academic awards and distinctions. These include the Alexander von Humbolt Research Prize, AIP Walter Boas medal and the

inaugural ANU Vice Chancellor Staff Career Award. He has chaired and organised numerous conferences and is frequently invited to lecture internationally.

Originally Professor Bachor studied for a PhD in physics in Germany and says he spent the first period of his career blowing things up. His research involved lasers and plasma physics and investigated sparks, arcs and lightning at very hot temperatures. In 1981 he came to Australia looking for an adventure, and was invited to stay and do post doctoral work at the ANU. Professor Bachor says at this time he eventually became a little frustrated with the physics he was doing because he could read it all in text books.

“I decided that I really wanted to do something that nobody had done before... this is how I got into the business of photons.” Because of the freedom offered by the ANU he had the opportunity to do more of what he liked - researching something novel – and he began to experiment with quantum optics.

During the award ceremony, Professor Brian James also said Hans Bachor “pioneered experimental quantum optics research in Australia.” He initiated the ANU Quantum Optics Group and has made major contributions to their scientific achievements since 1989.

“As soon as it became clear that this was going to be a big thing, I brought this technology to Australia and found the right people... We were sort of the front runners in Australia.” Quantum atom optics research has since expanded and Australia is regarded as a very strong player internationally. There are currently about 30 Australian research groups in almost half of our universities.

One of the leading players, nationally and internationally, is ACQAO. They are working on entanglement with photons and atoms, new technologies for Bose Einstein condensates, investigations of the statistics of fermions and bosons, atom lasers that produce coherent matter waves and atom interferometers. In the future their work will have many applications, such as secure quantum communication, quantum logic and for precision measurements, including mapping gravitational fields or improvements to atomic clocks.

Professor Bachor acknowledges his success could not have come about by working alone. “You can’t do physics yourself. I was very fortunate over the years to work with many teams. And I think, I’ve been playing on a team. I got into the sin bin occasionally. I’ve won some premierships. I became a trainer, a coach and maybe now a mentor. That’s how you progress. But I’ve always enjoyed the fact, that really, doing science is very much a team activity.”

Today, as director of ACQAO, Professor Bachor plays a guiding role and compares his job to that of a conductor. Everybody he works with is an amazing solo artist, but the most amazing sounds will come when everyone is playing as part of an orchestra. “Working together is an essential feature in science because everybody contributes

something different. Everybody thinks slightly different – theoretically, mathematically, like an engineer – and all of these styles are necessary.”

Professor Bachor is particularly proud of a collection of PhD theses on the bookshelf in his office. There lies the work of 28 postgraduates he has supervised and guided. The next two are working in the lab right now. He is happy all have been able to work hard, achieve their own success and choose a career. “Quite a number of them are now at universities and teaching, some are in industry and others are in administration. They have all found their way. I’m proud about the fact that I have helped them with one important step.”

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