News Release | For Immediate Release | March 7, 2012

Canadian-led research zaps antimatter

(Vancouver, BC) --- Three experiments, three groundbreaking scientific advances. In their latest paper published online today by the journal *Nature*, the ALPHA Collaboration at CERN reported on a measurement, spearheaded by their Canadian collaborators, which measured for the first time an intrinsic property of antimatter atoms. In doing so, they've provided the world with its first glimpse of an "anti-atomic fingerprint."

"For decades, scientists have wanted to study the intrinsic properties of antimatter atoms in the hope of finding clues that might help answer fundamental questions about our universe," says lead author Mike Hayden, a physicist with Simon Fraser University. "In the middle of the last century, physicists were developing and using microwave techniques to study ordinary atoms like hydrogen. Now, 60 or 70 years down the road, we have just witnessed the first-ever microwave interactions with an anti-atom."

After ALPHA's previous two measurements demonstrated that antihydrogen (the antimatter partner to normal hydrogen) could be trapped and then held for long periods, the ALPHA team immediately exploited those breakthroughs with another, detecting for the first time the response of trapped antihydrogen to microwaves. So-called "microwave spectroscopy" is used to make ultra-precise measurements of atomic properties.

"This study demonstrates the feasibility of applying microwave spectroscopy to fiendishly difficult-to- handle anti-atoms," says co-author Walter Hardy from the University of British Columbia. "ALPHA is about to enter an intensive upgrade phase that promises to create an ever-clearer picture of the inner structure of anti-matter atoms."

The ultimate goal is a precise measurement of antihydrogen's atomic properties to compare them to the very well-known properties of normal hydrogen. Any discrepancy will yield invaluable information for why the universe is dominated by normal matter, while the anti- matter has all but disappeared.

This latest breakthrough was driven by the Canadian contributors to the ALPHA collaboration, led by Professors Hayden and Hardy. Hardy and Hayden designed the apparatus for this latest experiment, working closely with Ph.D. candidates Mohammad Ashkezari of SFU and Tim Friesen (under the tutelage of Professor Robert Thompson) from the University of Calgary. Meanwhile researchers from TRIUMF and York University, led by ALPHA-Canada spokesperson Makoto Fujiwara and Professor Scott Menary, respectively, teased faint signals from a sophisticated detector system, pinpointing matter-antimatter annihilation events.

ALPHA Collaboration spokesperson Jeffrey Hangst of Aarhus University pointed out, "Hydrogen is the most abundant element in the universe, and we understand its structure extremely well. Now we can finally begin to coax the truth out of antihydrogen. Are they different? We can confidently say time will tell."

###

Media Contacts

Prof. Mike Hayden
Physics Department
Simon Fraser University
Cell: + 011.33.6.24.80.75.78
E-mail: mhayden@sfu.ca

Dr. Marcello Pavan
Outreach & Communications
TRIUMF
Tel: 604.222.7525
Cell: 604.868.7466
E-mail: outreach@triumf.ca

About TRIUMF

TRIUMF is Canada's national laboratory for particle and nuclear physics. Together with its partner AAPS, Inc., TRIUMF also seeks to commercialize its technologies for the benefit of all Canadians. Located on the south campus of the University of British Columbia, TRIUMF is owned and operated as a joint venture by a consortium of the following Canadian universities, via a contribution from the federal government through National Research Council Canada: University of Alberta, University of British Columbia, University of Calgary, Carleton University, University of Guelph, University of Manitoba, McMaster University, Université de Montréal, University of Northern British Columbia, Queen's University, University of Regina, Saint Mary's University, Simon Fraser University, University of Toronto, University of Victoria, University of Winnipeg , and York University. See http://www.triumf.ca.

About ALPHA-Canada

ALPHA is a collaboration of about 40 physicists from 15 institutions in Canada, Brazil, Denmark, Israel, Sweden, UK, and the USA. ALPHA-Canada currently consists of 9 senior scientists, 1 postdoctoral fellow, and 5 graduate students from 5 Canadian institutions. ALPHA-Canada constitutes about one third of the entire ALPHA collaboration. 15 out of 43 ALPHA co-authors in the reported work are with ALPHA-Canada: Andrea Gutierrez, Walter Hardy (Univ. of British Columbia), Tim Friesen, Robert Thompson (Univ. of Calgary), Mohammad Ashkezari, Michael Hayden (Simon Fraser Univ.), Chanpreet Amole, Andrea Capra, Scott Menary (York Univ.), Makoto Fujiwara, David Gill, Leonid Kurchaninov, Konstantin Olchanski, Art Olin, Simone Stracka (TRIUMF). See http://alpha.web.cern.ch/alpha.