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**FOR IMMEDIATE RELEASE****APRIL 14, 2008, 9:00AM PDT****A First for Canada: B.C. R&D Partnership Hits Milestone and Enters Elite “Superconducting” League**

(Vancouver, B.C.) — A team of B.C. scientists and engineers drawn from the TRIUMF laboratory and PAVAC Industries, Inc., announced today they have entered into an elite league of groups worldwide able to manufacture ultra-sophisticated superconducting accelerator technology. The B.C. team was able to fabricate, assemble, and test a high-tech device known as a “superconducting radio-frequency cavity” or SRF cavity. This success is a first for Canada and registers the country into an exclusive group of only five groups in the world with this coveted capability. These superconducting devices are assembled into modules to form next-generation accelerators with applications in health care, environmental mitigation and remediation, advanced materials science, and high-energy physics.

“This milestone is truly significant,” said TRIUMF director Nigel S. Lockyer. “The push for this technology started in particle-physics research but it is growing in demand all over the world. And Canada now has the ability to compete for and contribute to that market.” This technology is at the leading edge and rapidly expanding; laboratories around the world are lining up to incorporate it into their future projects. Literally tens of thousands of the devices will be needed over the next decade.

The superconducting accelerator modules are so technologically sophisticated that until now, only four industry-based groups in the world have had the capability to produce them. The most challenging element is the cavity itself, a hollow cylinder fashioned from pure niobium used to capture and store radio-frequency energy (similar to that broadcast by a radio station). Particles passing through the cavity receive a dramatic boost in energy. Accelerated particle beams are used in semiconductor chip manufacturing, sterilization and imaging in hospitals, and in many research laboratories for probing the detailed structure of materials, molecules, or even atoms and nuclei themselves.

The TRIUMF team was headed by Robert Laxdal who sought out PAVAC Industries, Inc. in Richmond, B.C., for their expertise in the tricky step of careful welding in a vacuum. Laxdal said, “We developed the first stage of the TRIUMF project using cavities fabricated in Italy; during the second stage of the project, the TRIUMF/PAVAC partnership was formed with the goal to develop a ‘Made in Canada’ solution.” PAVAC is a world leader in developing commercial high-energy electron beam applications, most notably the PAVAC LASTRON beam for Electron Beam Welding, which was integral to the manufacture of the cavities.

Speaking about PAVAC’s role in the project, president Ralf Edinger president said, “Our goal is continuous and systematic improvement of this process as applied to our particle-beam technology in order to make Vancouver a global centre for accelerator and electron-beam technology.” The development of this new industrial capability can be expected to have further large impacts on broader sectors of science and industry. For example, PAVAC is commercializing Electron Beam Flue Gas Treatment for the conversion of fossil-fuel emissions to fertilizer in large industrial facilities. TRIUMF is currently exploring a significant partnership with India for this technology.

By combining the talents of the TRIUMF scientists and the PAVAC engineers, the team was able to plan, design, and fabricate the first cavity. About twenty more cavities will be produced by the team to complete the expansion of a heavy-ion superconducting linear accelerator at TRIUMF.

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**TRIUMF is operated as a Joint Venture by:**

The University of Alberta  
The University of British Columbia  
Carleton University  
L’Université de Montréal  
Simon Fraser University  
The University of Toronto  
The University of Victoria

via a contribution through the National Research Council of Canada

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## **BACKGROUND:**

The **superconducting radio-frequency cavity** was fashioned from pure niobium and will be used to accelerate particles such as electrons, protons, or ions. Accelerators are used around the world not only in basic physics research, but also in hospitals and industrial laboratories to generate pencil beams of energy. Accelerators are even used in x-ray generators, both modern plasma and older cathode-ray tube TVs, and microwave ovens. For the next generation of accelerators, however, superconducting elements are needed because they are able to store electromagnetic energy without resistance. The cavity stores up energy (typically similar to the radio waves used in FM radio transmission, hence the term radio-frequency) and when electrically charged particles pass through it, the particles receive an accelerating kick that boosts their speed. A series of these cavities can be used to accelerate particles close to the speed of light.

The skill set acquired to manufacture the cavities will be applied by PAVAC for advanced pollution control applications. PAVAC is pursuing the commercialization of Electron Beam Flue Gas Treatment, a proven application that converts fossil-fuel emissions from large industrial facilities into fertilizer. Subatomic-physics research has developed other technologies that promise additional pollution control applications including the environmental remediation of soil and water.

**TRIUMF** is Canada's National Laboratory for Particle and Nuclear Physics. Based in Vancouver, the facility is a world-class physics research laboratory. TRIUMF hosts scientists from around the globe who conduct fundamental research in advanced materials, life sciences, and particle and nuclear physics to understand the building blocks of our world. It is funded via a contribution through the National Research Council Canada with support from the Province of British Columbia. TRIUMF is owned and operated as a joint venture by a consortium of the following Canadian universities: University of Alberta, University of British Columbia, Carleton University, l'Université de Montréal, Simon Fraser University, University of Toronto, and University of Victoria. See <http://www.triumf.ca>

**PAVAC Industries, Inc.** is a privately held Richmond, BC, based company with a mission to be one of the top 3 commercial manufacturers worldwide, delivering high-energy electron beam sources and advanced electron beam accelerator technology. PAVAC has developed commercial applications for Electron Beam Rapid Manufacturing, Electron Beam Physical Vapour Deposition, Electron Beam Flue Gas Treatment and Electron Beam Welding and Micro-Machining. PAVAC is Transport Canada Approved Maintenance Organization (AMO #91-07).

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