

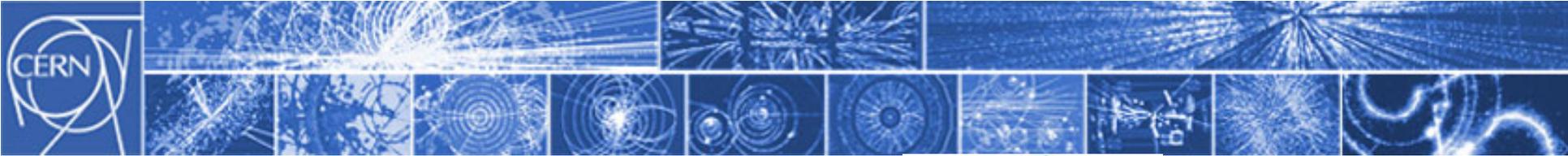
Technology Transfer

Enrico Chesta

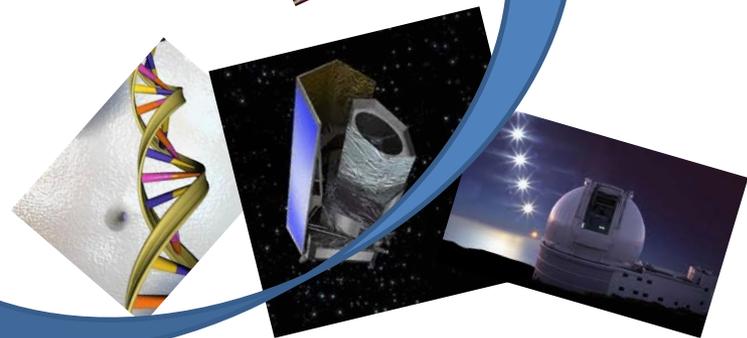
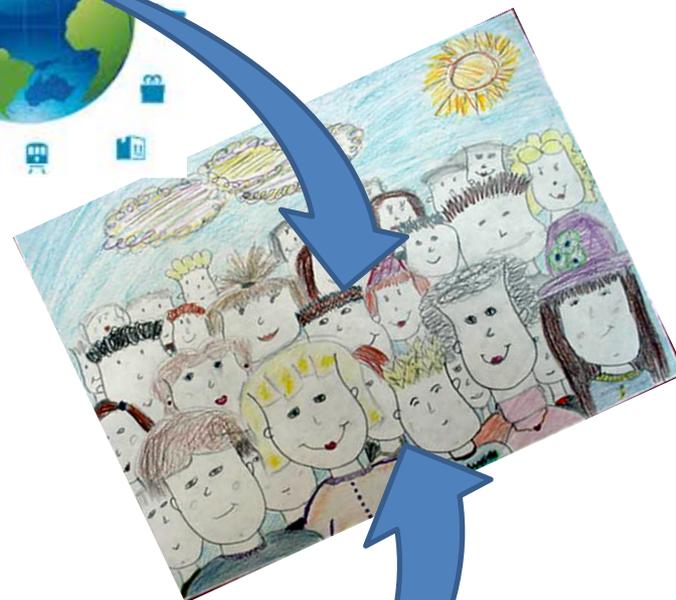
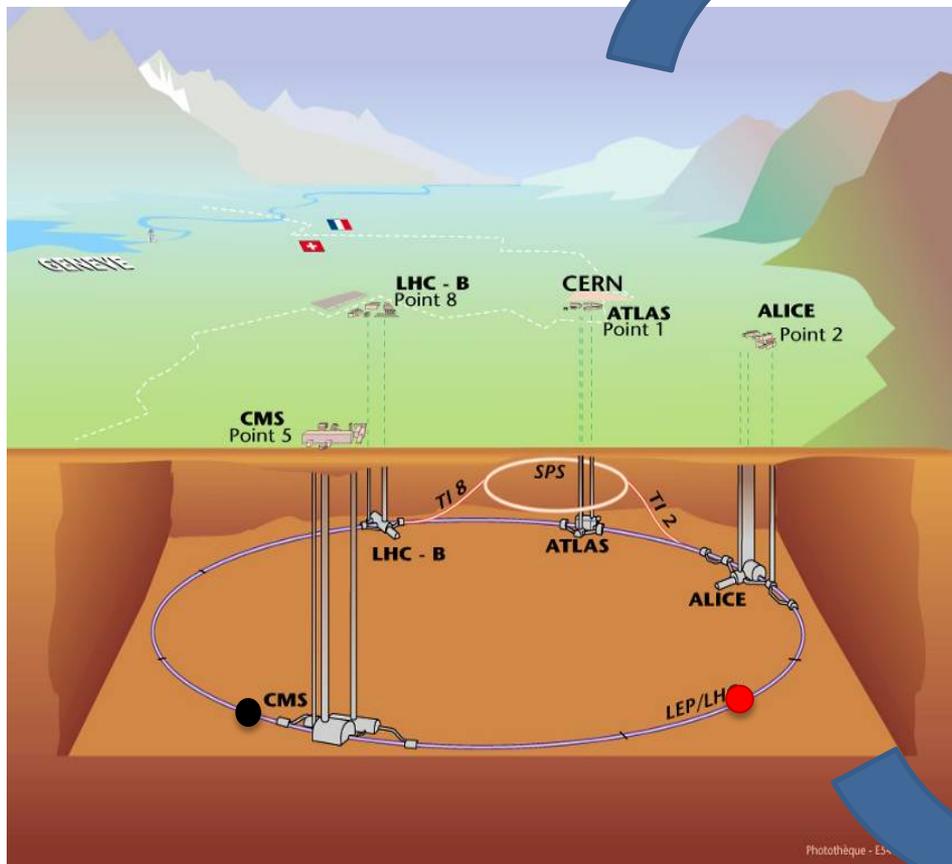
Head of CERN Technology Transfer and
Intellectual Property Management Section

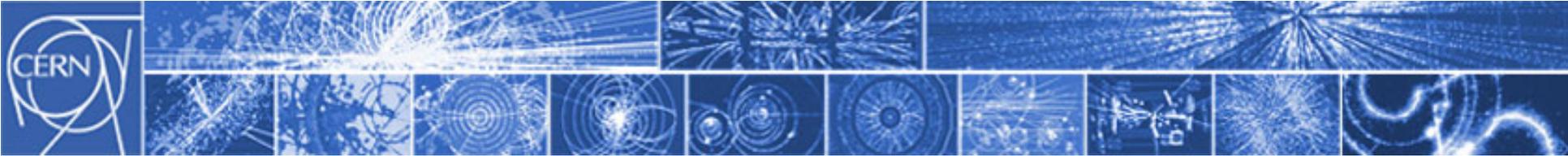
Chairman of the EIROforum Thematic Working Group on
Innovation Management and Knowledge/Technology Transfer



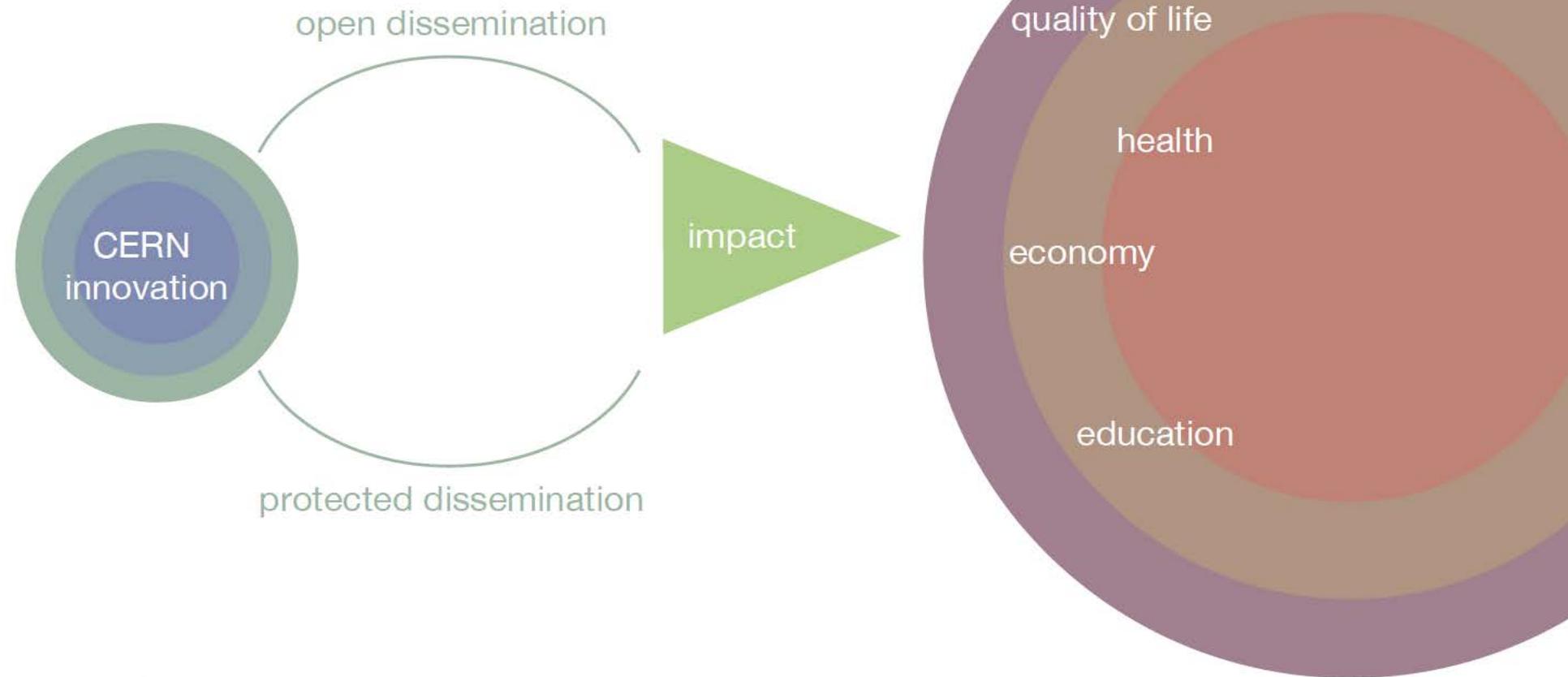


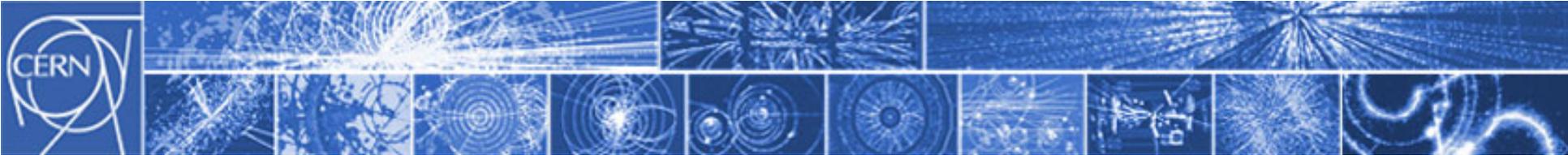
Target



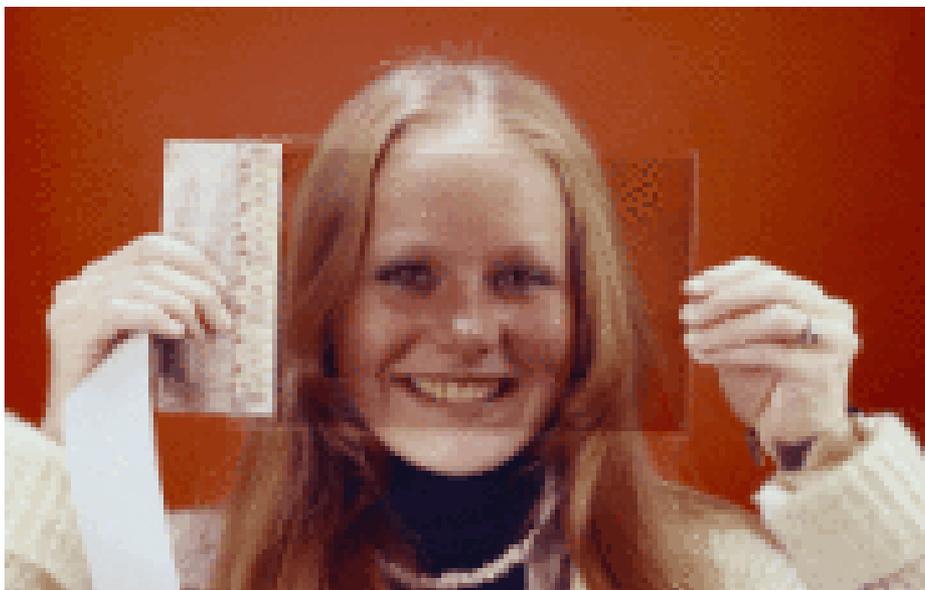


Impact-driven Approach

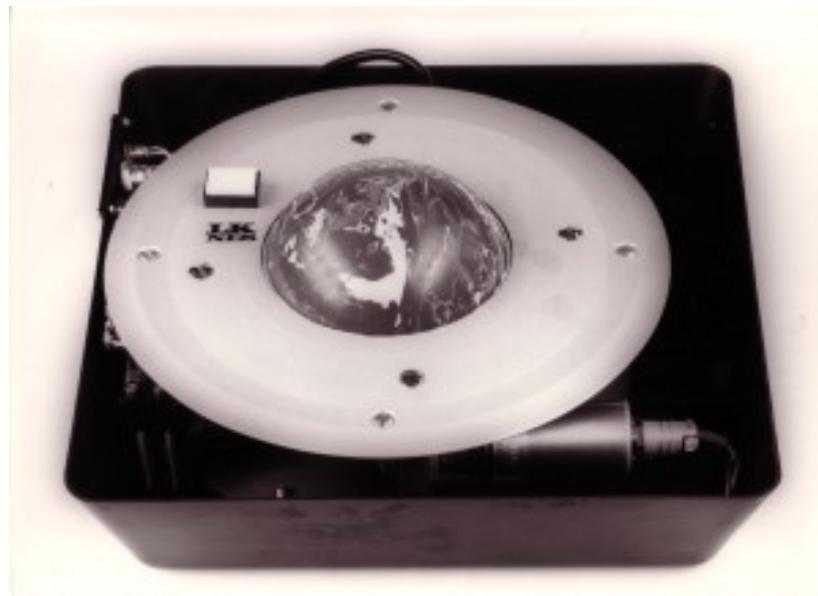




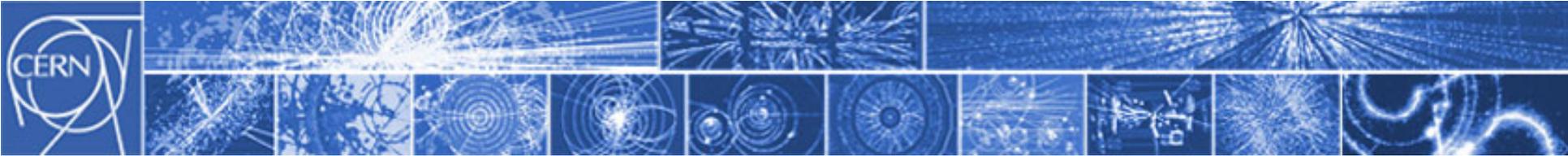
Not a trivial process...



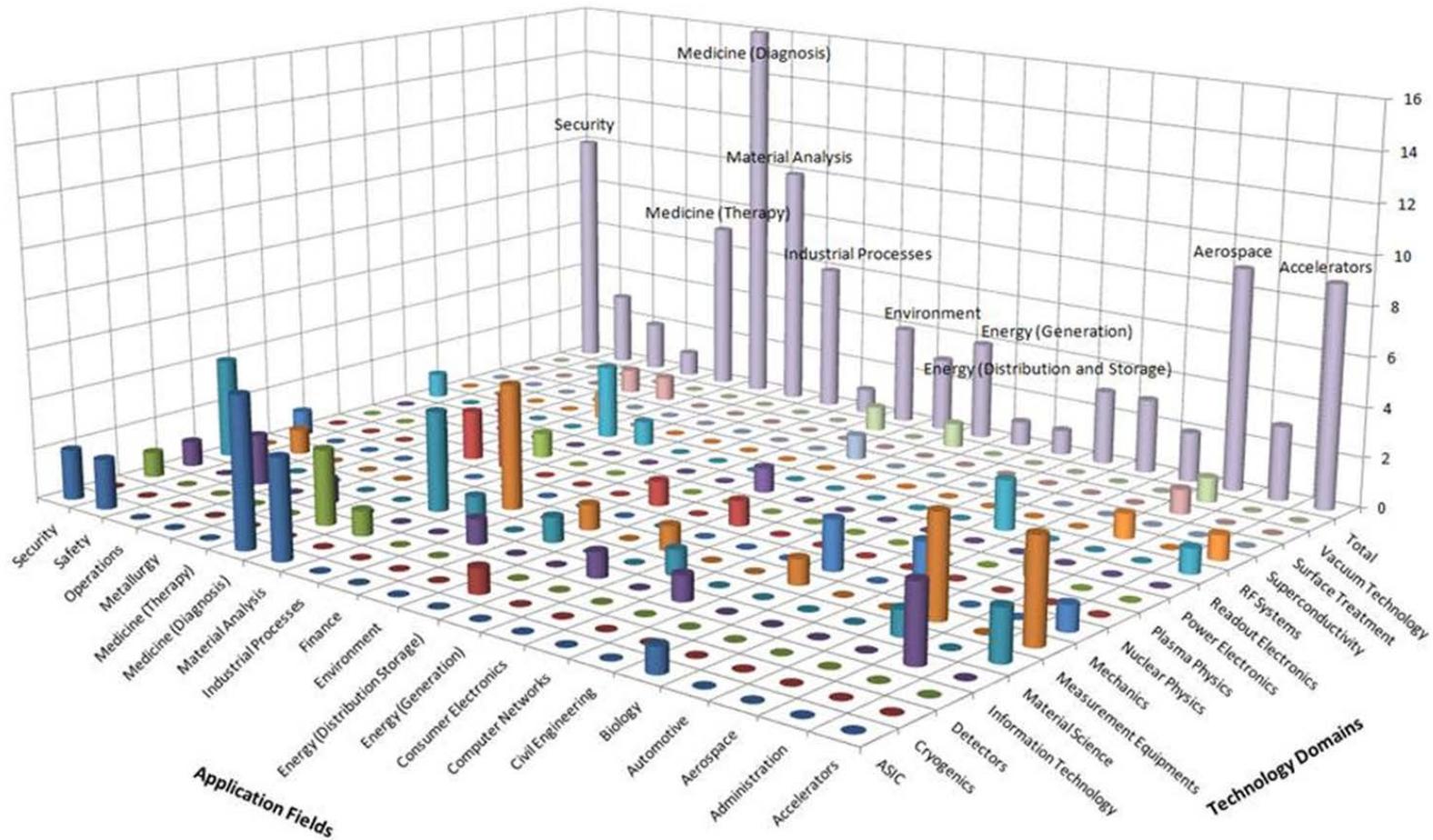
First «Touch-Screen»

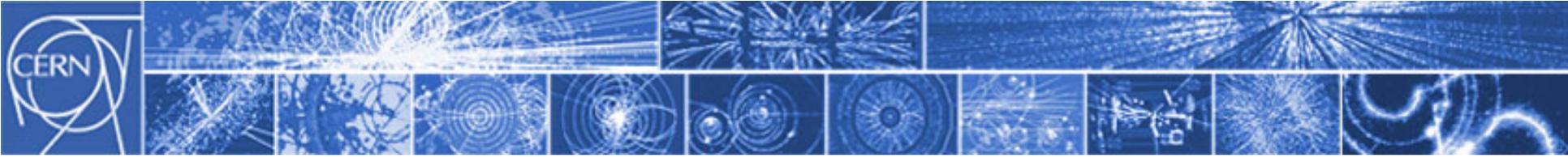


First «Mouse»

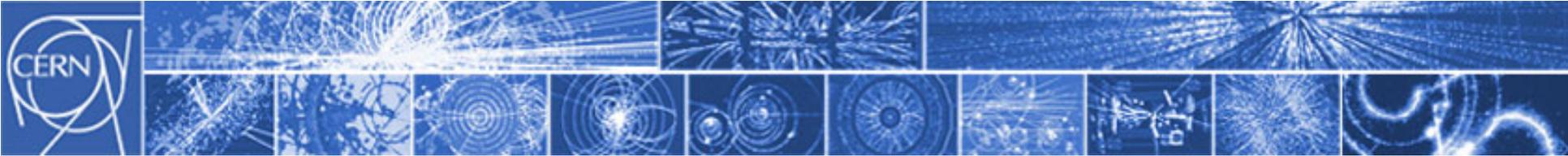


... but can be rewarding



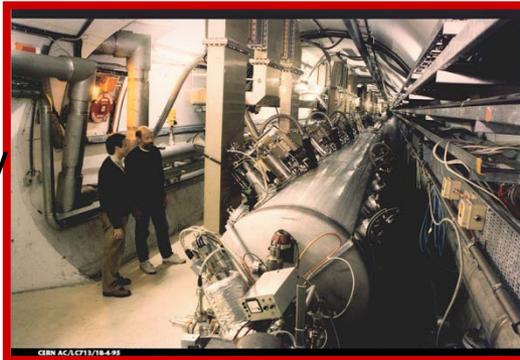


Examples

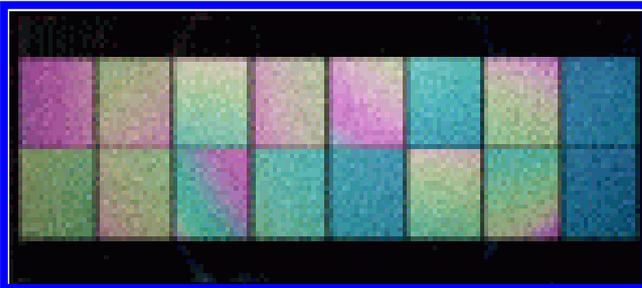
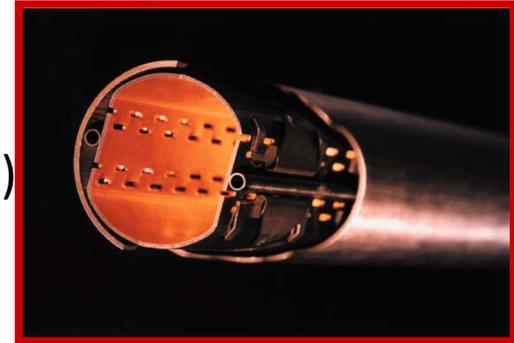


Core Competences

Super-conductivity
(13kA,
7MJoules)



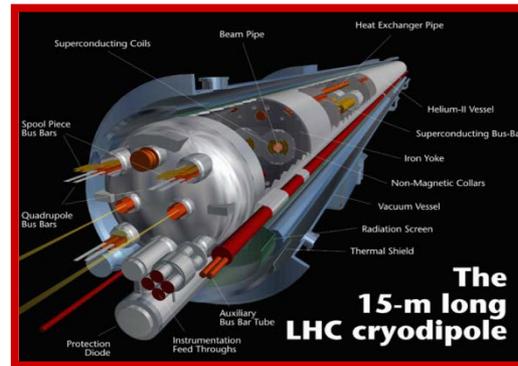
Vacuum
(10^{-12} Torr)



Very high
performance
detectors and
electronics

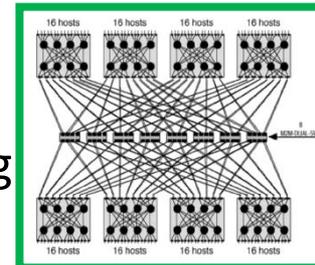


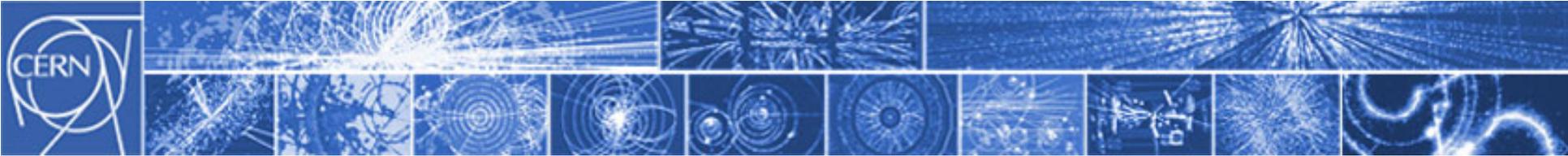
Cryogenics (1.9 K)



Magnets
(10 T)

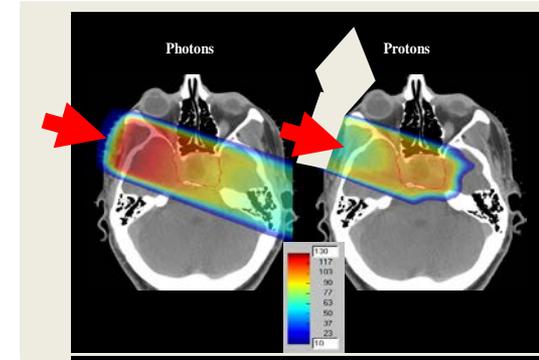
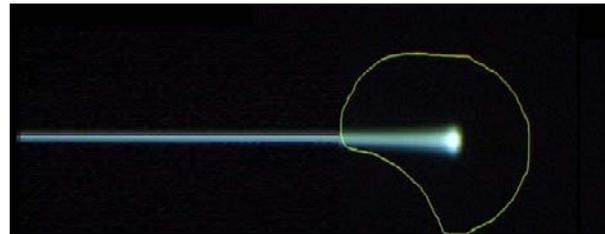
Data processing
(15 PB/year)



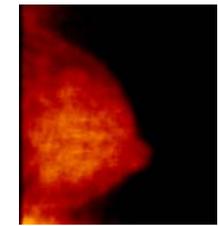
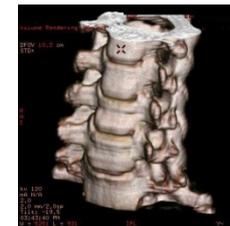
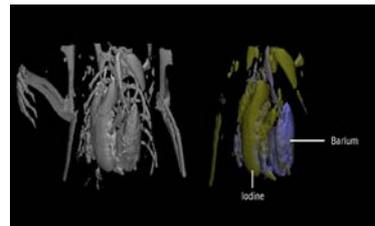
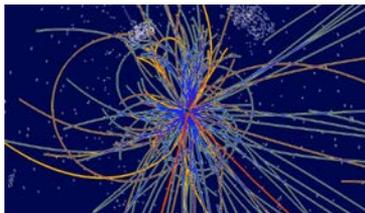


Medical Applications

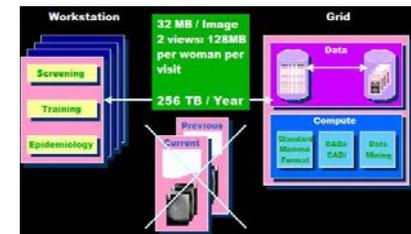
Particle accelerators for hadron therapy

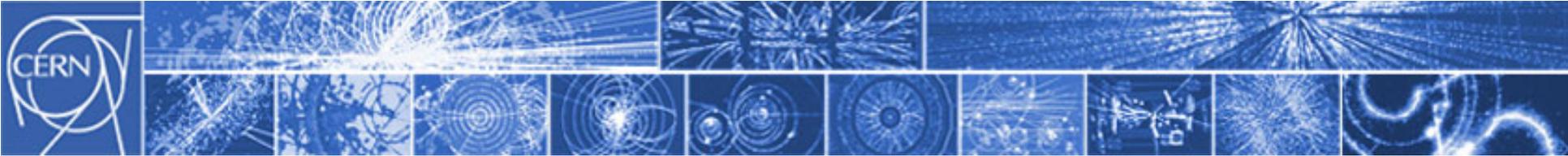


Particle detectors for medical imaging



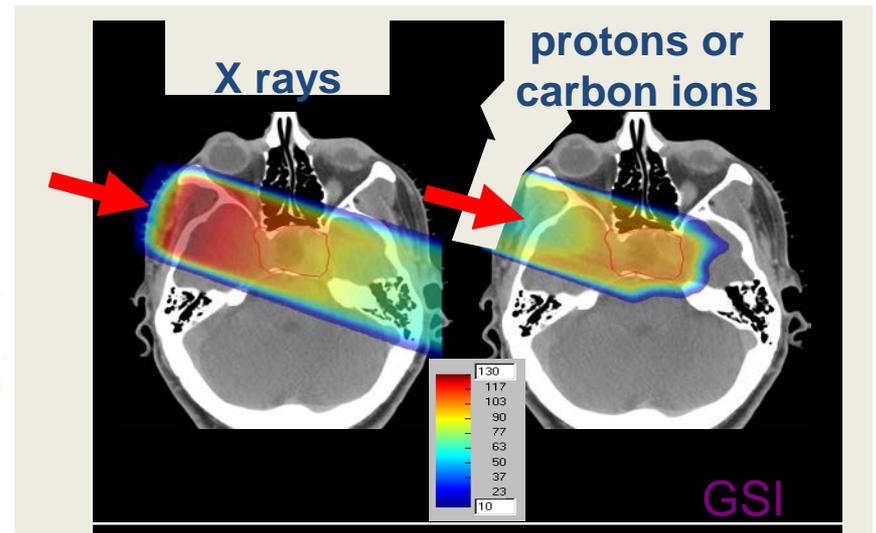
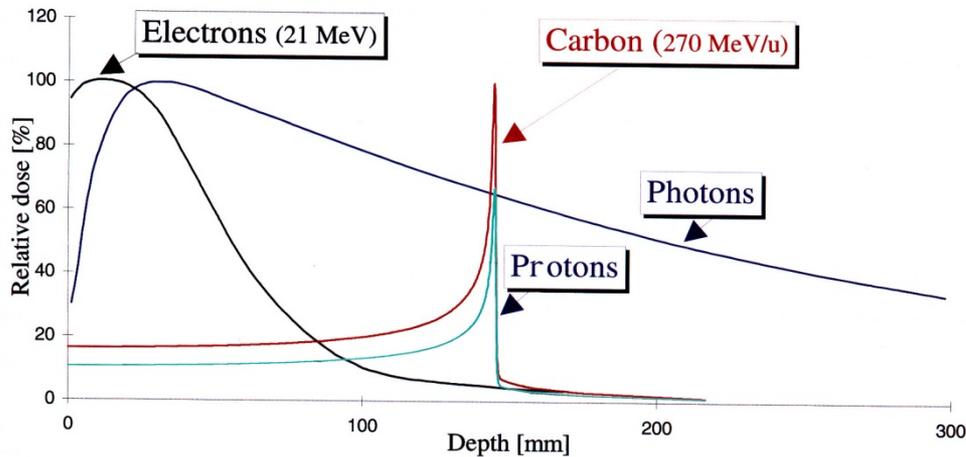
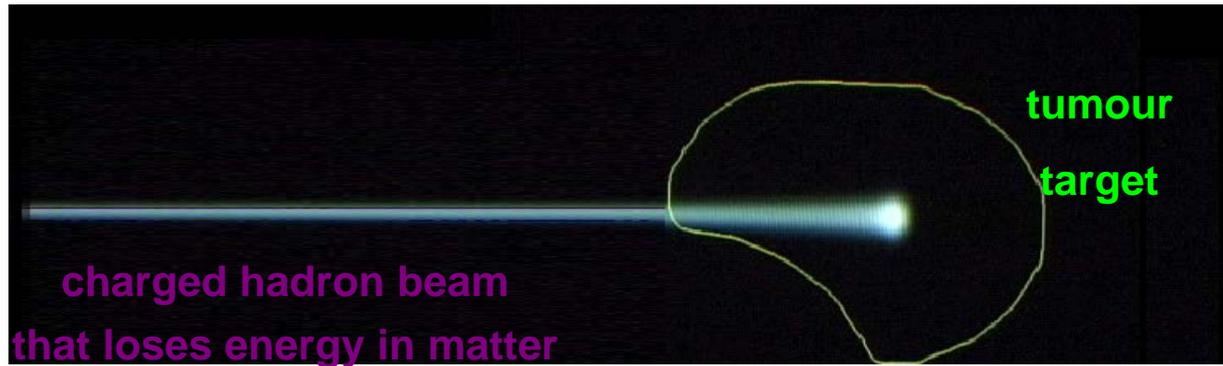
Grid computing for medical data management and analysis



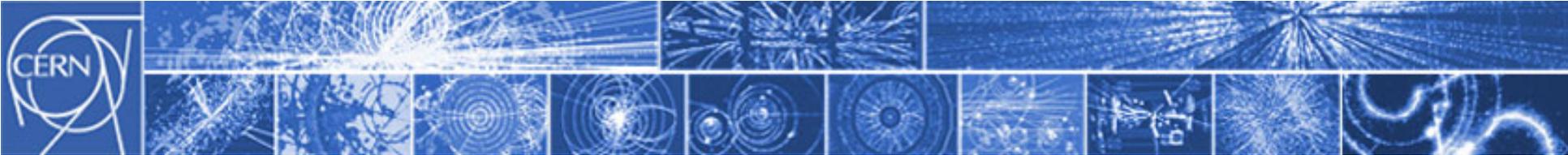


Hadron Therapy

Hadron beams:
new treatment
opportunities for
deep-seated tumours



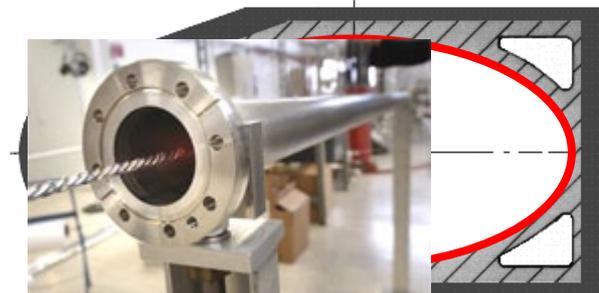
C ions: 24 times more energy than protons

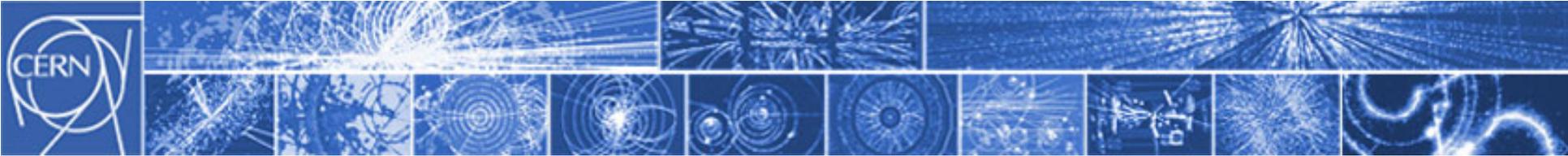


NEG

- **N**on-**E**vaporable **G**etter thin film coatings
- Used to create and maintain ultra-high vacuum in accelerators by absorbing gas molecules in vacuum chambers
- Have multiple other applications in addition to accelerators

NEG thin film coating





NEG

- CERN most successful patent!
- 8 Licenses
- 3 Service/Consultancy agreements
- Used in research laboratories like DESY, GSI and ESRF
- One CERN Spin-Off (SRB Energy)



(12) **United States Patent**
Benvenuti
 (10) Patent No.: **US 6,468,043 B1**
 (45) Date of Patent: **Oct. 22, 2002**

(54) PUMPING DEVICE BY NON-VAPORISABLE GETTER AND METHOD FOR USING THIS GETTER	3,544,829 A	12/1970	Soneya et al.
	4,038,738 A *	8/1977	Fischmeister et al. 29/420.5
	4,050,914 A *	9/1977	Murphy 417/51
(75) Inventor: Cristoforo Benvenuti, Moens (FR)	4,097,195 A *	6/1978	Hill 417/49
(73) Assignee: European Organization For Nuclear Research, Geneva (CH)	4,157,779 A *	6/1979	Ishii et al. 228/176
	5,101,167 A *	3/1992	Ikegami 328/233
	5,626,682 A *	5/1997	Kobari et al. 134/8
	5,688,708 A *	11/1997	Kato et al. 437/51

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.:	09/202,668	CA	622379 *	6/1961 417/48
(22) PCT Filed:	Jun. 18, 1997	DE	745134	12/1943	
(86) PCT No.:	PCT/E/97/03180	DE	3814389 A1	11/1989	
	§ 371 (c)(1),	EP	0 426 277 A2	5/1991 323/233
(2), (4) Date:	Dec. 18, 1998	FR	953730	12/1949	
(87) PCT Pub. No.:	WO97/49109	GB	828982	2/1960	
	PCT Pub. Date: Dec. 24, 1997	WO	94/02957	2/1994	

FOREIGN PATENT DOCUMENTS

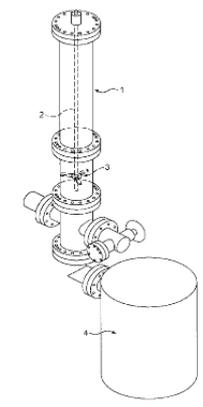
* cited by examiner

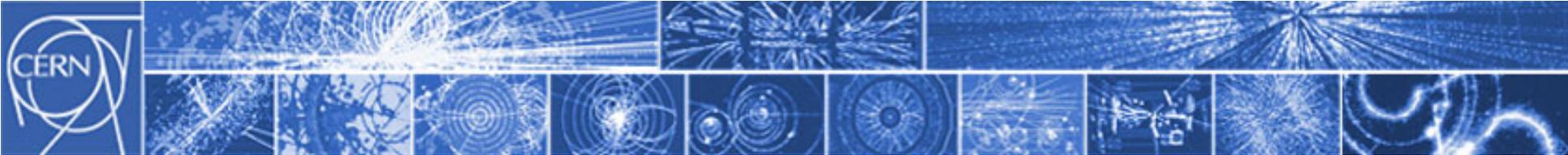
Primary Examiner—Cheryl J. Tyler
 (74) Attorney, Agent, or Firm—Larson & Taylor PLC

(57) **ABSTRACT**
 The invention discloses a pumping device by non-vaporizable getter to create a very high vacuum in a chamber defined by a metal wall capable of releasing gas at its surface, characterized in that it comprises a thin layer of non-vaporizable getter coated on at least almost the whole metal wall surface defining the chamber.

(56) **References Cited**
 U.S. PATENT DOCUMENTS
 2,175,695 A * 10/1939 Knippen 252/181.1

3 Claims, 1 Drawing Sheet





SRB Energy

- Spin-off company
- Uses NEG to create ultra high vacuum flat panel solar collectors
- Captures diffused or indirect light
- Solar thermal with very high temperatures up to 300 degrees
- Six additional patents filed and jointly owned by SRB Energy and CERN:

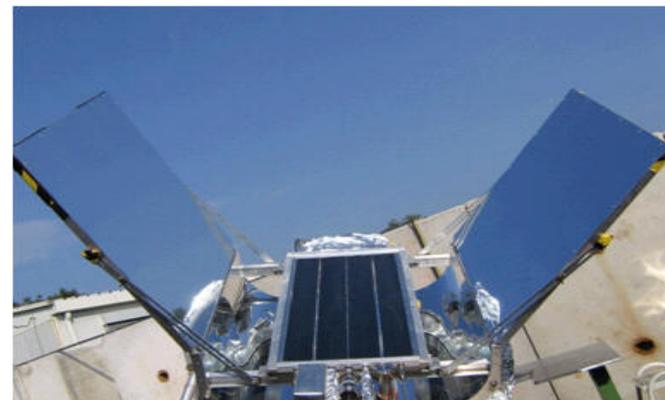
Device for vacuum tight soldering an evacuated solar collector
Solar panel collector with cooling conduits comprising thermal expansion means

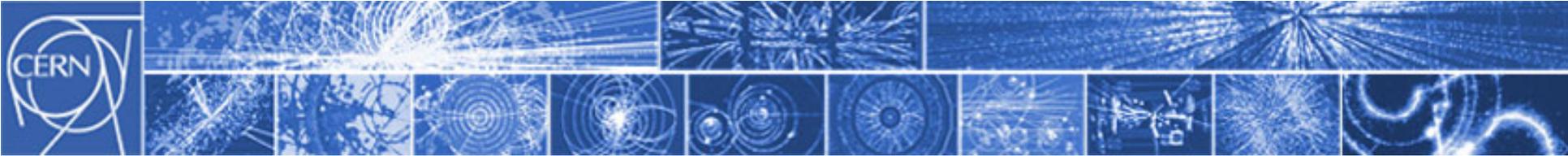
Protective device for a solar panel collector

High efficiency evacuated solar panel

Evacuated solar panel with non evaporable getter pump

Sealing mechanism for an evacuated device





Evacuated Solar Panels for Geneva Airport



Press Release

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Press Releases | For Journalists | For CERN People

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- 1993

A major contract has been signed for the supply of solar panels derived from CERN technology

PR07.12
09.03.2012

Geneva, 9 March 2012. At Geneva International Airport today SRB Energy delivered the first of the solar panels that will form one of the largest solar energy systems of Switzerland. Ultimately, some 300 high-temperature solar thermal panels will cover a surface of 1200 square metres on the roof of the airport's main terminal building. The panels, which will be used to keep the buildings warm during the winter and cool in the summer, are derived from vacuum technology developed at CERN for particle accelerators.



SRB Solar Panel - Solar field from Valencia

"We are delighted that Geneva International Airport has opted for this technology," says Cristoforo Benvenuti, the inventor of the panels, who has been working on vacuum technology at CERN since the 1970s. *"The panels emerged from vacuum technologies that were developed for fundamental physics purposes, and it is highly gratifying to see them put to use for renewable energy."*

"This new generation of solar panels is an innovative green technology that is the fruit of a partnership between CERN and industry", explains Enrico Chesta, head of the Technology Transfer Section of CERN's Knowledge Transfer Group.

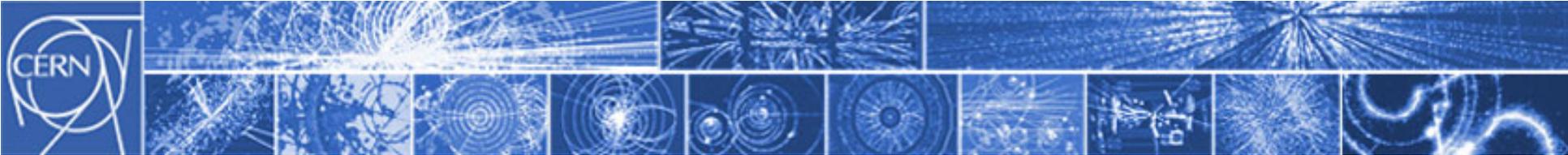
[Geneva Airport Movie](#)



Technology Transfer and Intellectual Property Management

3rd EIROforum School on Instrumentation
29/05/2013 Industrial Session

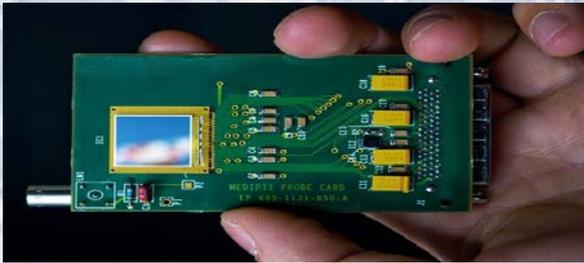




**More examples?
See KT Poster...**



Knowledge Transfer | Accelerating Innovation



MEDIPIX 3 is a 256 x 256 channel hybrid pixel detector readout chip working in single photon counting mode with a new interpixel architecture which aims to improve the energy resolution in pixelated detectors by mitigating the effects of charge sharing between channels.

APPLICATIONS

- MicroCT.
- Mammography.
- Full body scanner.
- Material analysis using XRD, XRF, S(W)AXS and XRR.

EXTERNAL PARTNERS

- MARS BioImaging (New Zealand).
- Panalytical BV (The Netherlands).

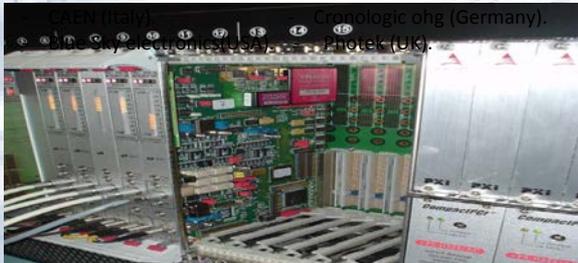


HPTDC is a high performance time to digital converter ASIC used in applications requiring precise time tagging of electronic signals. At CERN it has been used in the ALICE TOF, CMS DT and NA48 detectors. It is also widely used outside CERN (STAR, BES, OKU, KABES, HADES).

APPLICATIONS

- Time of flight mass spectrometry.
- LIDAR.
- Electronics testing.
- Scientific Instrumentation equipment.
- TCSPC, FLIM/FRET.

EXTERNAL PARTNERS



FAST DIGITAL INTEGRATOR (FDI) is a self-calibrating digital instrument for flux measurement on magnets for accelerators used in basic research on subnuclear particles. The instrument samples the voltage from rotating coil transducers. These samples are integrated on-line and suitably processed in order to improve time resolution and flux accuracy. The instrument was prototyped at Magnetic Measurement and Testing (MTM) Group of CERN, under a framework of collaboration with the University of Sannio.

APPLICATIONS

- Precision magnetic field measurements.

EXTERNAL PARTNERS

- Metrolab Technology S.A. (Switzerland).

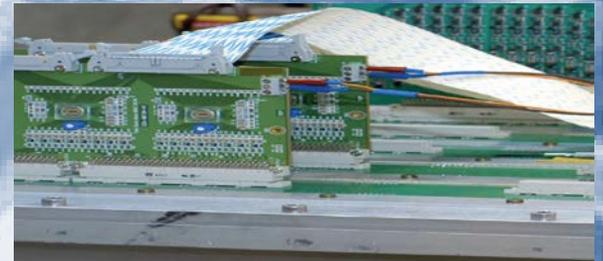
NINO is an 8-channel amplifier and discriminator ASIC originally developed to exploit the excellent timing properties of the Multigap Resistive Plate Chamber (MRPC) in the ALICE TOF detector. The features of this chip are differential input, very fast amplifier with less than 1ns peaking time and input charge measurement by Time over Threshold.

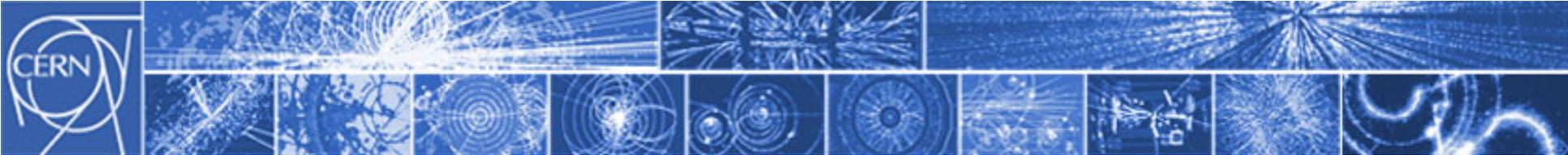
APPLICATIONS

- Fast Neutron Imaging.
- TOF-PET.
- Neutron detection in A1 experiment in MAMI.
- Cherenkov detectors in PANDA experiment.

EXTERNAL PARTNERS

- University of Tennessee (USA).
- University of Chicago (USA).
- Universita Politecnica de Catalunya (Spain).
- University of Mainz.





Podium Discussion – suggested topics

- 1- Attractiveness of industry as employer: career perspectives for young engineers/physicists
- 2- R&D challenges in new industrial developments oriented to series production
- 3- How industry perceives academy and research labs as partners for R&D collaborations: dangers and opportunities, how to do better
- 4- Importance of Intellectual Property for industry competitiveness: patents and publications policies, joint ownership versus licensing of innovation
- 5- Entrepreneurship: compatibility of scientific and business models, challenges and rewards