

CERN

European Organization for Nuclear Research  
Organisation Européenne pour la Recherche Nucléaire

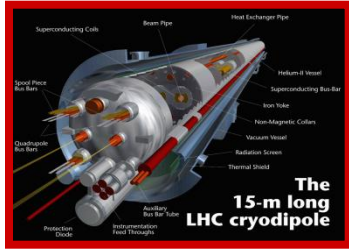
# Cryogenic Technologies Brokering Meeting Opportunities for TT

STFC Kite Club event, London 23<sup>rd</sup> October 2008  
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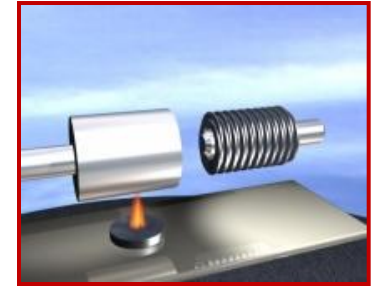
# Outline

- 1. TT@CERN – Mandate/Facts & Figures**
- 2. Framework - Transfer Opportunities**
- 3. Opportunities for TT**



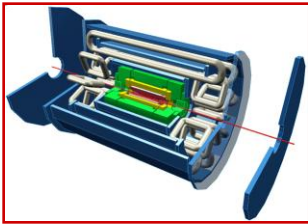
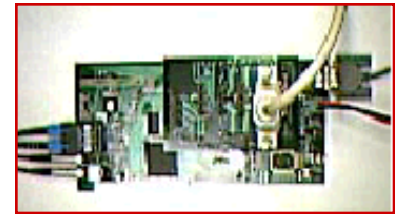
Accelerators,  
Magnet & Cryogenics

Mechanical  
Engineering



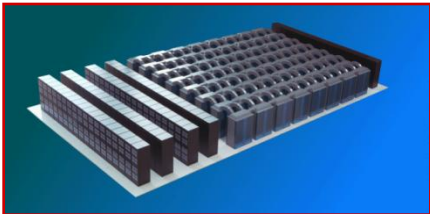
Detectors &  
Instrumentation

Electronics



Information  
Technologies

Materials Science

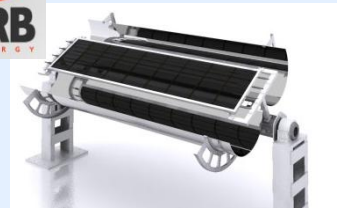


## TT@CERN, MANDATE

- ❑ Maximize technology & Knowledge return to the Member States industry without diverting from CERN HEP mission
- ❑ Promote and enhance the image of CERN as a source of innovation and economic activities and increase attractiveness for industry
- ❑ Take all the necessary IP protection measures to support technology dissemination

## Facts & Figures

- ❑ Technology Transfer started @CERN - **2000**
- ❑ 33 Patent families, 200+ Patents
  - 11 R&D Projects (period 2007/2008 until date)
  - 15 Licenses (period 2007/2008 until date)
- ❑ Leveraging value for start-ups



## Dissemination channels

Commercialization of CERN IP

**1. Licensing**

**2. Services&Consultancy**

TT R&D Projects

**3. Partnerships**

**4. Collaborations** (*involves only other R&D Institutes*)

## Dissemination principles

- First option and favorable conditions to Member State industry
- Equal opportunities for the commercial actors in the Member States
- Dissemination Vs income
- Market price
- Military application are excluded

## 1. Licensing

### Object of the licenses

- Patent
- Copyright (software, chip masks, documented design)
- Know-how and technical expertise

*May include the supply of technology*

### Principles

- Technology licensed on an “as-is” basis
- Non-exclusive licenses (normally)
- Restrictions may apply

## 2. Services&Consultancy

### Object of the service or consultancy contracts

- Unique know-how and expertise
- Unique equipment or facility

### Principles

- Technology licensed on an “as-is” basis
- Market price
- Licensing approach preferred if feasible
- Subject to availability of the key resources

### 3. Partnerships

#### Object of Partnerships

- Development of commercial product based on CERN technology and/or expertise
- Pre-competitive R&D (basic technology, feasibility studies, ...)

#### Principles

- Technology provided on an “as-is” basis
- The commercial partner usually have exclusivity on the results of the partnership project in his target market
- Full access to background Intellectual Property through license agreements

#### FUNDING

- **No funding from CERN, however access to infrastructure is possible**
- **Public funding is possible (CERN is eligible for EC and national funding schemes like STFC, UK)**

## 4. Collaborations

### Object of Collaborations

- Academic members only (*at least in the initial collab. setup*)
- Core technology with applications in Particle Physics and in commercial markets

### Principles

- Promising technology is protected by suitable IP mechanisms
- Collaboration members have free access to results for R&D purposes
- Exploitation agreements with commercial actors are possible through (licenses or partnerships) for specific markets

### FUNDING

- Only by Academic members

## 1. CERN Central Cryogenic Laboratory (infrastructure & capabilities)

- Vertical Cryostats
- Glass Cryostats
- Cold Traction facility
- MLI test facility
- Heat transfer characterization
- Thermo-mechanical analysis and tests at Cryogenic temperatures
- Cryo-coolers (GM types and Pulse Tubes)
- 10mK Dilution refrigerator
- Mechanical and instrumentation workshop
- Clean-room
- Assembly and testing areas – 3 buildings

## Availability

- CERN;
- Availability to be defined on a case by case basis:
- Services & Consultancy (unique equipment or know-how or facility)

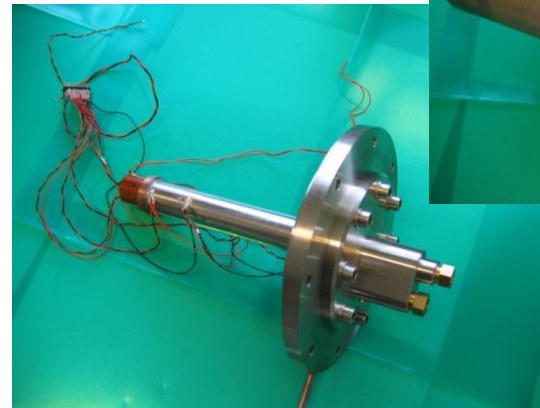
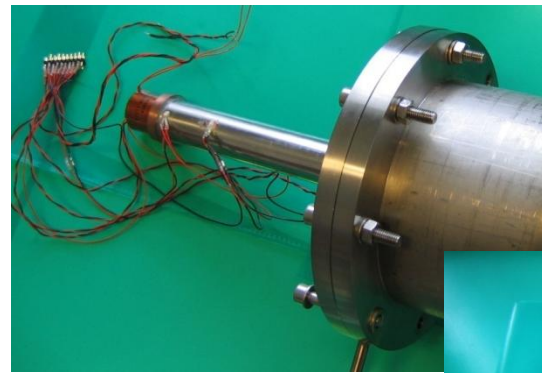


## 2. Pulse Tube Refrigerator

- **Advantages**
  - Simplified design = compactness
  - Minimized dead volume (elimination of needle valves and connection tubes)
  - Increased efficiency and lower temperatures could be achieved = 20K
  - A weight of only 2kg not difficult to achieve

## Potential applications

- **Space:** space based telescopes or astronomical detectors in space shuttles;
- **Low noise cooling:** infrared sensors used in night vision equipments, pollution monitoring;
- Cryo-medical instrumentation as MRI systems, organ preservation and cryosurgery;
- Liquefy and/or separation of gases, cryo-pumping;

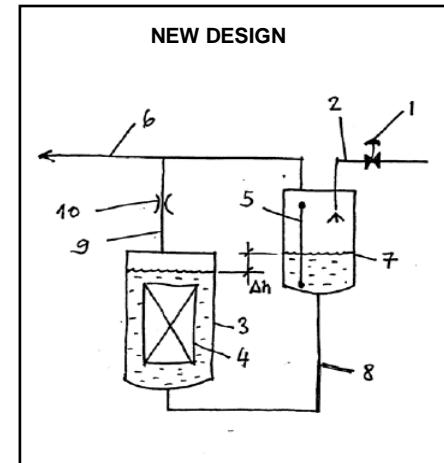


## IP ownership & availability

- CERN;
- Examination phase (Patent pending);
- Available for Licensing;

### 3. Installation for cryogenic cooling for superconductor device

- **Description:** A new configuration contains two vessels, the cryostat and the recovery vessel. When a quench occurs in the first vessel, the pressure in the cryostat increases. The liquid helium quickly goes back to the recovery vessel. In this way the helium is saved for later use instead of being lost. As the quench goes over, the pressure in the cryostat vessel drops down to a point where the transfer of liquid from the recovery vessel restarts. Developed at CERN for the training of superconducting magnets for LHC;



### Potential applications

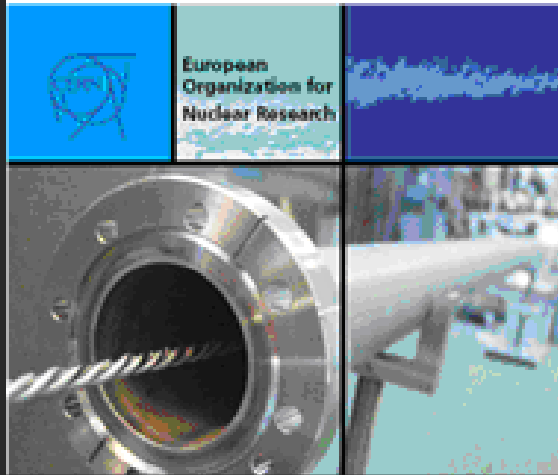
- Training/quenching of superconducting magnets;



### IP ownership & availability

- CERN;
- Patent granted in France, National phase;
- Available for Licensing;

# Application of a CERN technology to develop a new Solar Collector



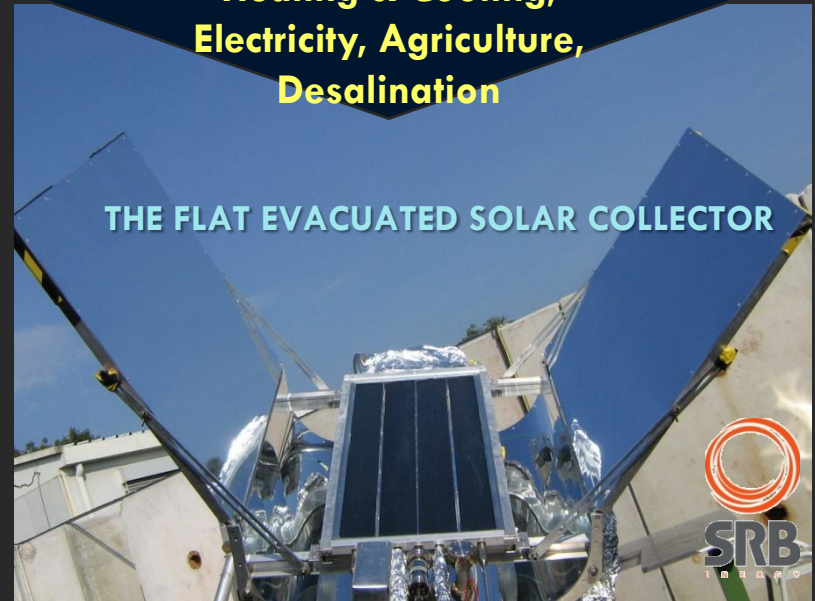
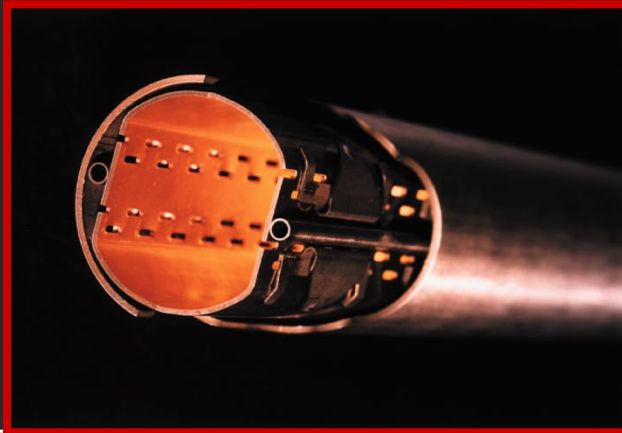
High vacuum  
for flat solar  
collectors



Achieve XUHV  
( $10^{-13}$  Torr) in  
vacuum tubes

Heating & Cooling,  
Electricity, Agriculture,  
Desalination

THE FLAT EVACUATED SOLAR COLLECTOR



Prototype of a flat panel solar collector developed at CERN in Partnership with Industry. Industrial production just started: First series optimized for electricity production

Technology  
Transfer

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