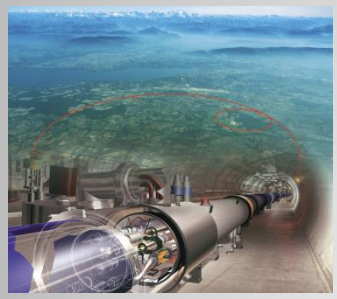
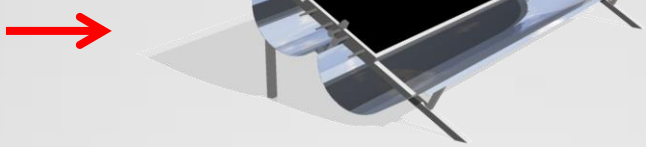
From Accelerator Technology to Solar Heating and Cooling

Dr. Helfried Burckhart, CERN





What have accelerators and solar panels in common?

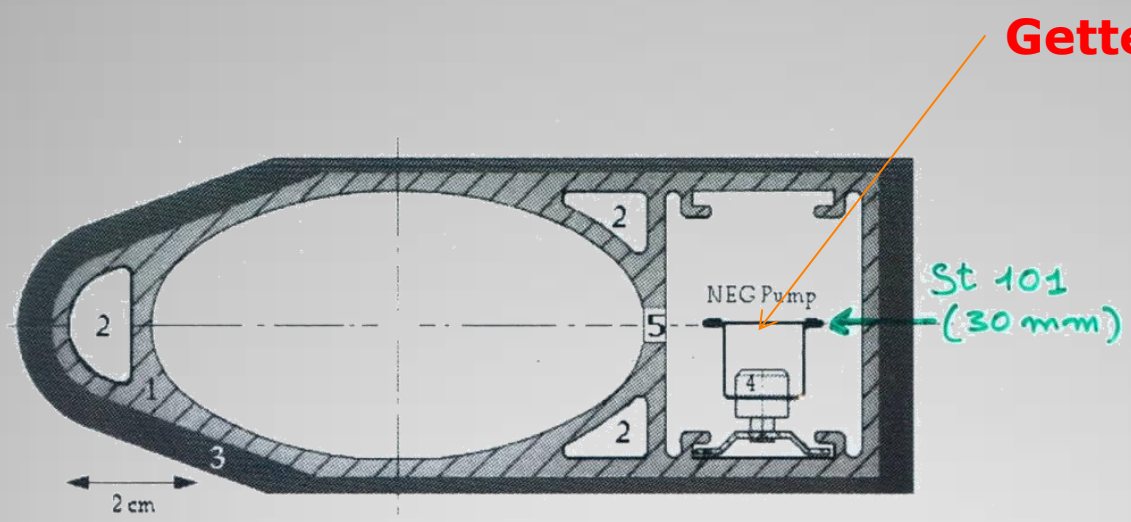
Nothing

Nothing = **Vacuum**

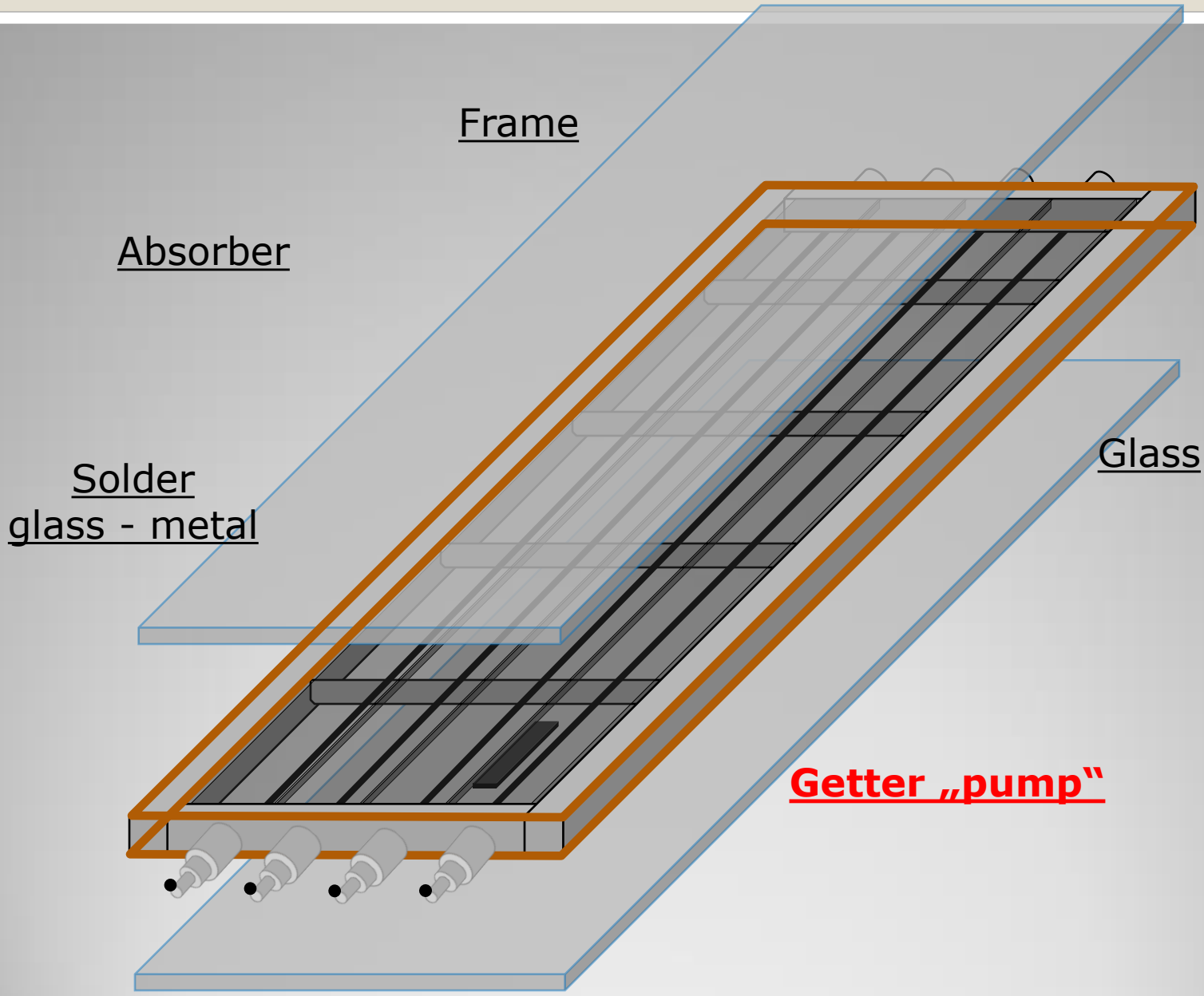
	Accelerators	Solar panels
Problem	Collisions proton-gas	Thermal losses
Solution	**Vacuum**	
Technique	**Getter Pump**	

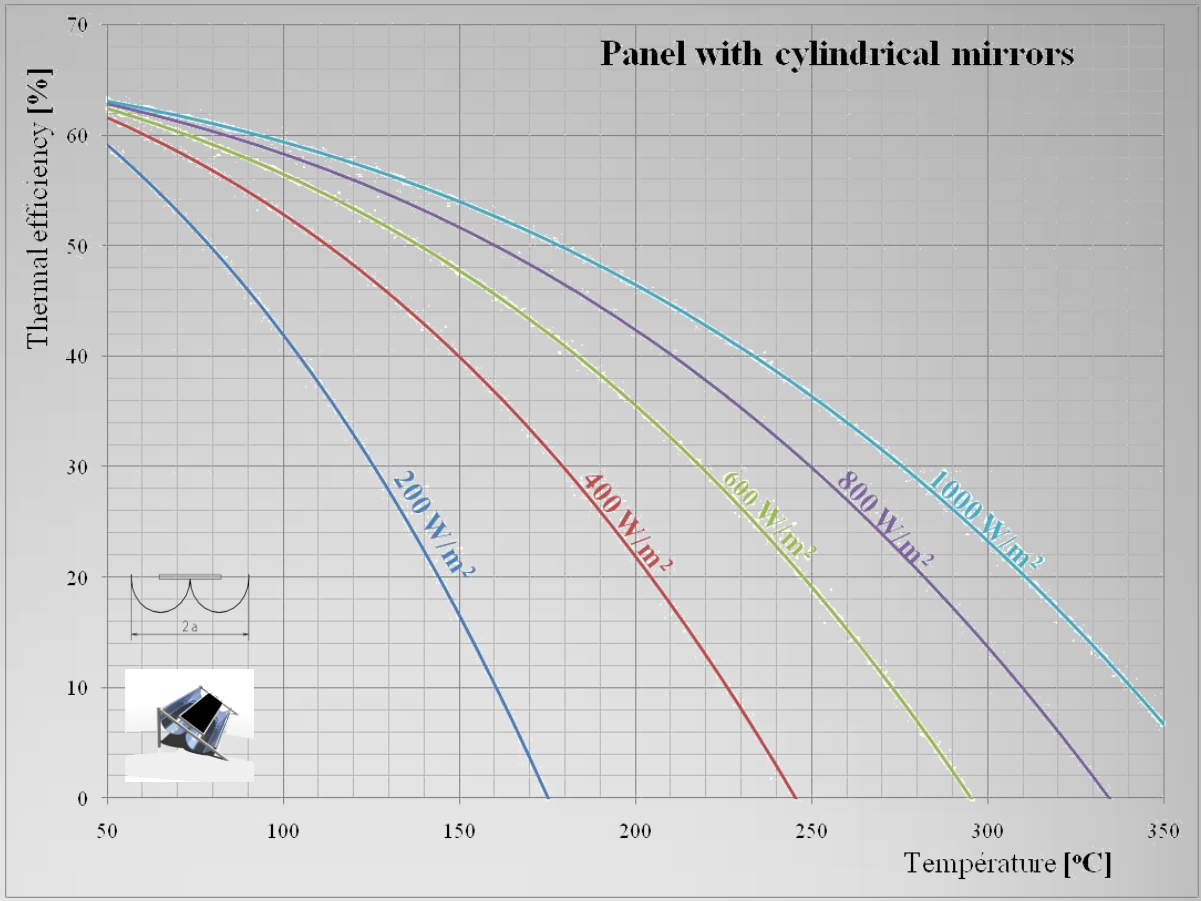
Sticky paper strip catching flies, but for molecules

Beam pipe of the **L**arge **E**lectron **P**ositron collider(LEP)



Chambre à vide du LEP

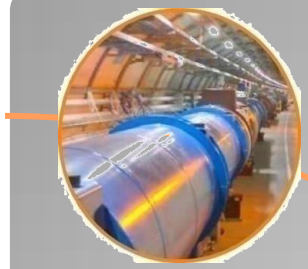

Frame
Absorber
Solder
glass - metal
Glass
Getter „pump“

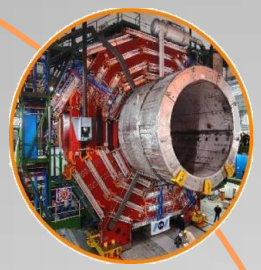


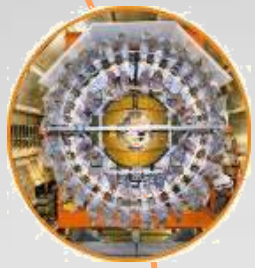
Efficiency as function of temperature


SRB

Technologies used

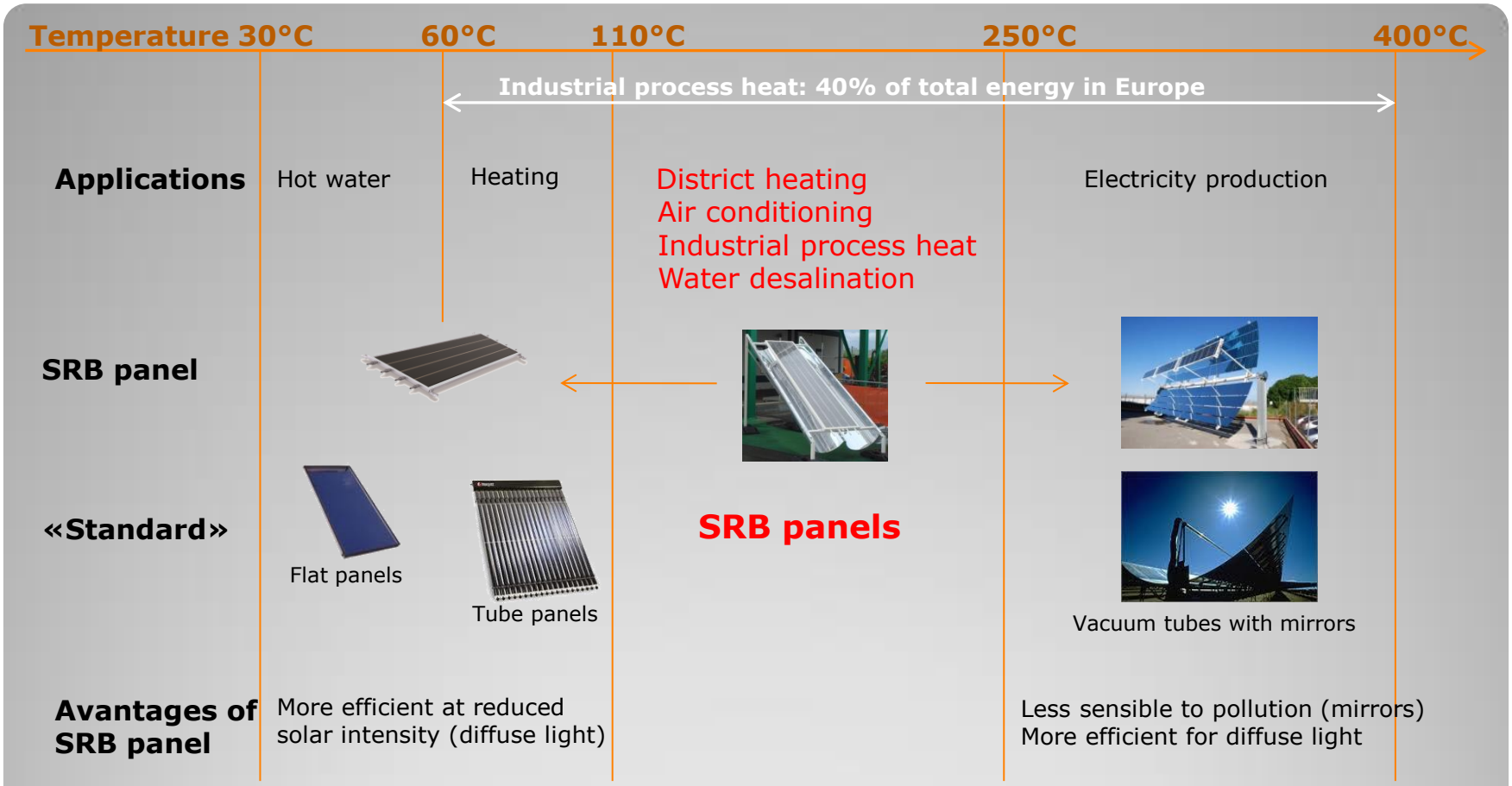






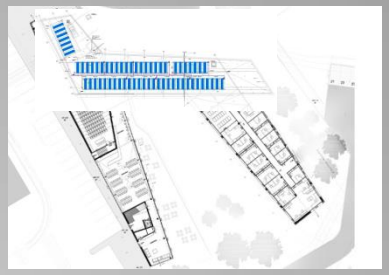
- Ultra High Vacuum
- Getter "pump"
- Surface Treatment
- Soldering glass - metal

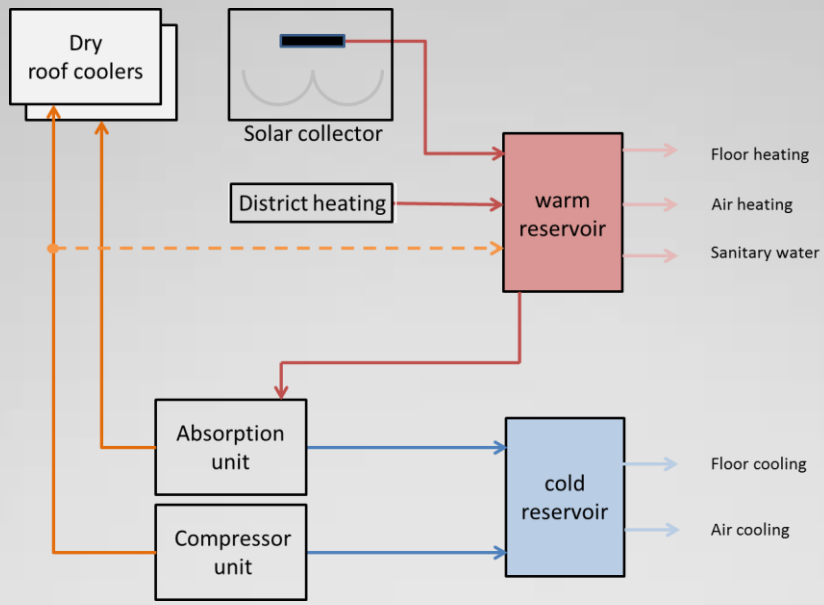
- Technologies developed at CERN
- R&D by SRB Energy, Geneva
- Panel production at SRB Valencia



Solar thermal technologies and applications

Thermal concept of new CERN building





Thermal need

- Heat
  - Radiant floor
  - Air circulation
  - Sanitary water
- Cooling
  - Offices
  - Public areas
  - Computers

Thermal concept

- Central water reservoirs
  - Warm: 3 m^3 at 60 - 95 °C
  - Cold: 10 m^3 at 6 - 10 °C
- Coupling warm and cold thermal streams
  - Re-use of waste heat
- Priority scheme for solar energy

Summary

- Accelerator technology has been used to develop a novel type of thermal solar collector
- It combines the advantages of the two "traditional" types of solar panels
  - High thermal efficiency
  - Good geometric efficiency
  - Ease of installation
- Special features of the SRB collector
  - Robustness of operation
  - High output temperature possible (>300 °C)
  - Full use of diffuse light with concentration factor 2
  - Wide range of application
- A new at CERN building implements a integrated concept for thermal energy, giving priority to regenerative energy