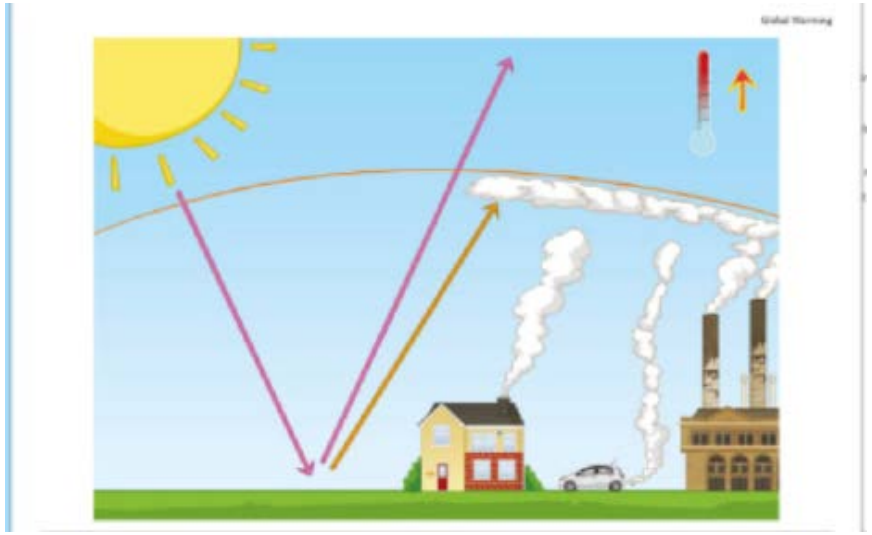
Programma

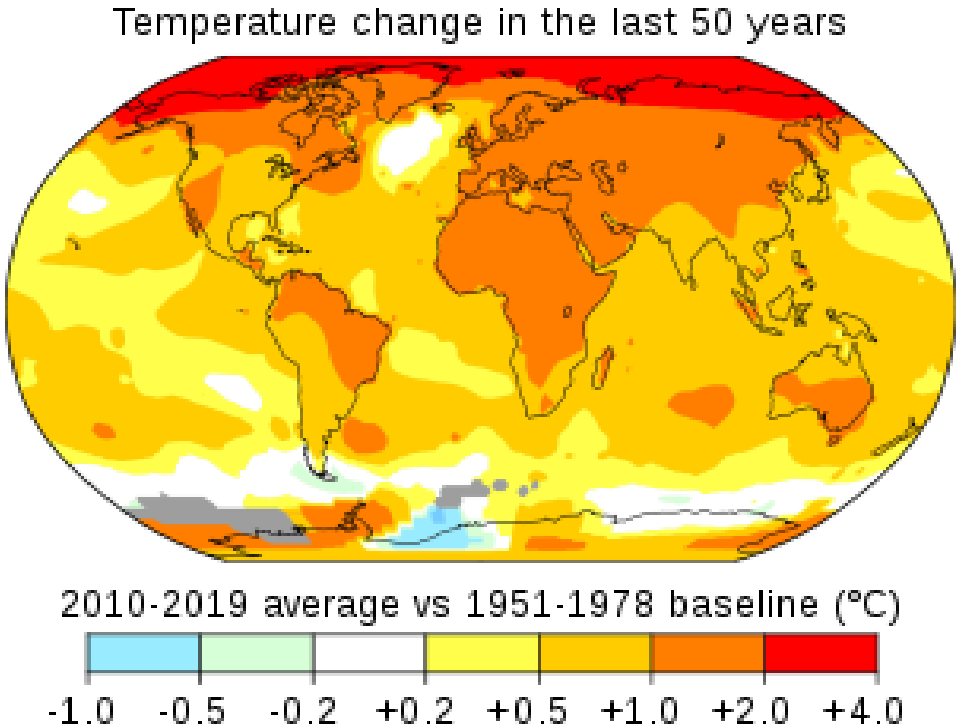
- **31 Luglio**, Inaugurazione - ore 11:00
- **11 Agosto**, "Lo Specchio Lineare" - H. Grassmann (Università di Udine) - ore 16:00
- **13 Agosto**, "L'attualità del meccanismo di Anticitera" - P. Bussotti (Università di Udine) - ore 11:00
- **18 Agosto**, "Solutions for a CO2 free planet" - F. Malek (CNRS France) - ore 16:00
- **24 Agosto**, Workshop cianotipie - ore 14:00 - A. Castellan
- **25 Agosto**, Workshop stenotipia - ore 14:00 - L. Tolotti
- **26 Agosto**, "Project collaboration in Africa" - D. Kobor (Université Assane Seck de Ziguinchor) - ore 11:00
- **3 Settembre**, "La bibliotheca inestimabilis, scrigno dei saperi" - R. Otranto (Università di Bari) - ore 11:00
- **8 Settembre**, "Lo Specchio Lineare e il ciclo chiuso delle Biomasse" - H. Grassmann (Univeristà di Udine) - M. Citossi (Università di Udine) - ore 16:00
- **10 Settembre**, "Conclusione dei lavori" - H. Grassmann - ore 16:00

Fisica&Arte contro la CO_2

Solutions for a CO_2 free planet

F. Malek (CNRS France)






WE'RE SLOWLY BEING COOKED IN A POT!!!!
WE'RE SLOWLY BEING BOILED IN A POT!!!
SEE? THERE'S NO CONSENSUS...
SCIENTIST
SCIENTIST
DENIER
CLIMATE CHANGE


THE PRELIMINARY ROUND
CLIMATE CHANGE

Each year , nearly **36 Billion of tons** of greenhouse gas , **rich in $C0_2$** are rejected in the atmosphere contributing to the temperature increase, to the increase of ocean levels and to the climate change and its effect on bio-diversity including the human beings comfort.

Among many other solutions is the **decarbonization**

- capture C02 Before the fumes
- do no reject the fumes
- storage deep in earth (boundary dam)
- transform and use it → heat, plastic objects, energy

→ Technique works also for the decarbonization of the Methane

Saskatchewan, Canada

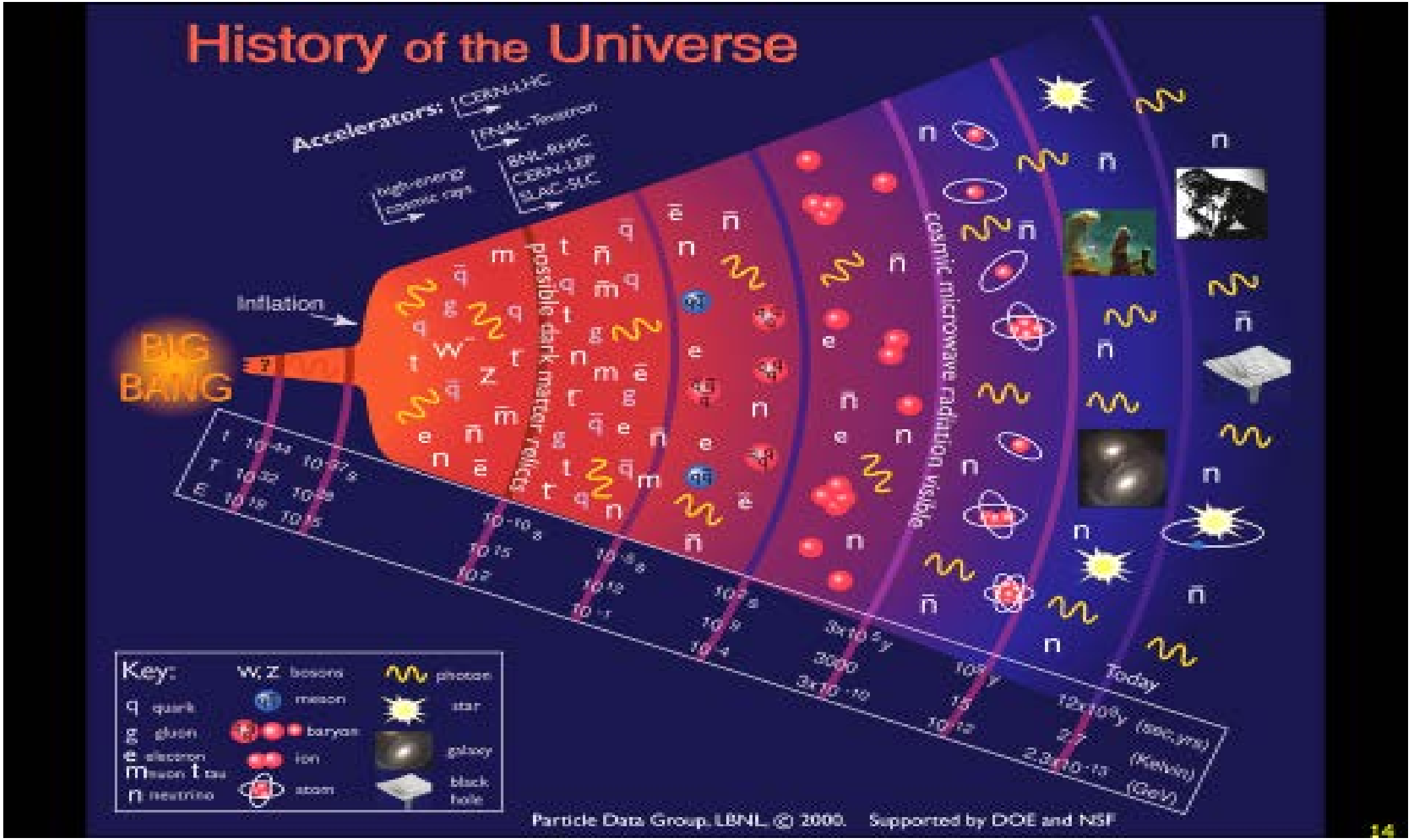
Other solutions to have a “toxic” C02 free planet are to avoid using oil and coal. For this, one should increase the part of renewable energies

Other CO2 free energies	PROs	CONs
Solar/Photovoltaic	Sun	Silicon technology is a pollution, Pb with Storage, economically weak
Wind turbines	Wind is natural and do not free $C0_2$	Economically not viable, cannot be applied everywhere, depend on the geography, heavy maintenance, low productivity
Nuclear power plants	Efficient productivity, low cost	Nuclear safety risks
Hydro-electricity	Very clean	Not available everywhere Lacs, montains, water
Geothermal	Very clean	Not available everywhere

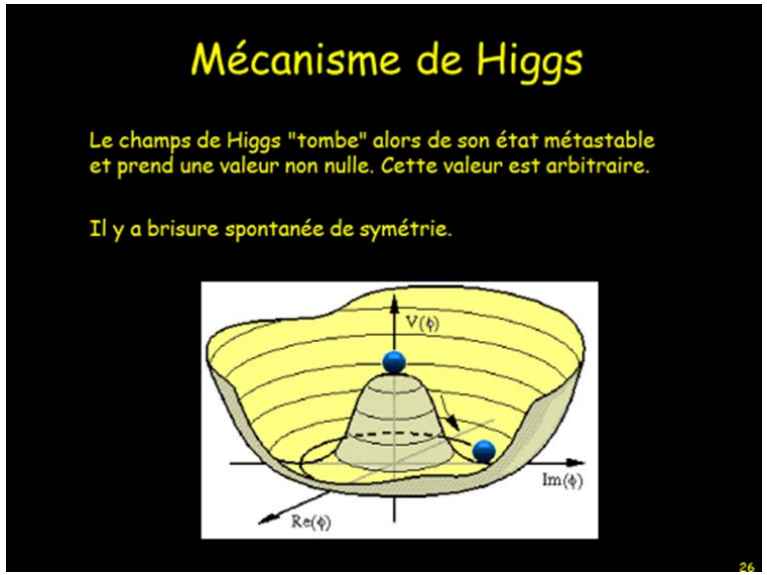
→ Technology is mature and no progress can be made as of today
→ Effective technologies for providing Electricity and Energy ONLY
→ There are not YET known efficient technologies for producing **renewable HEAT** and burning trees and destroying forests cannot be the solution

A little bit of fundamental physics research

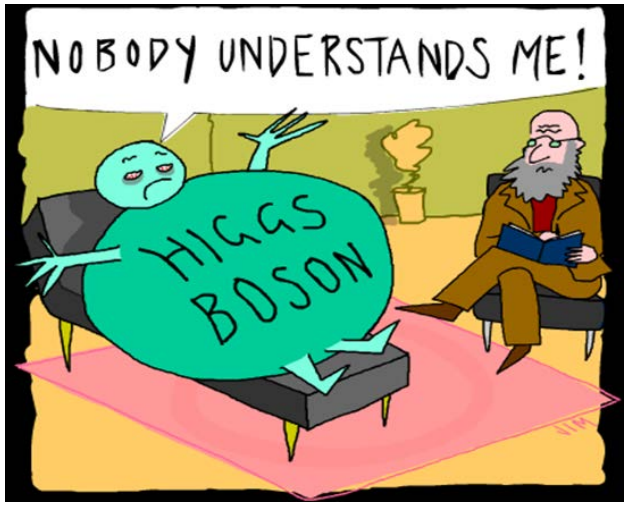
PHYSICS, matter, Cosmos and NATURE

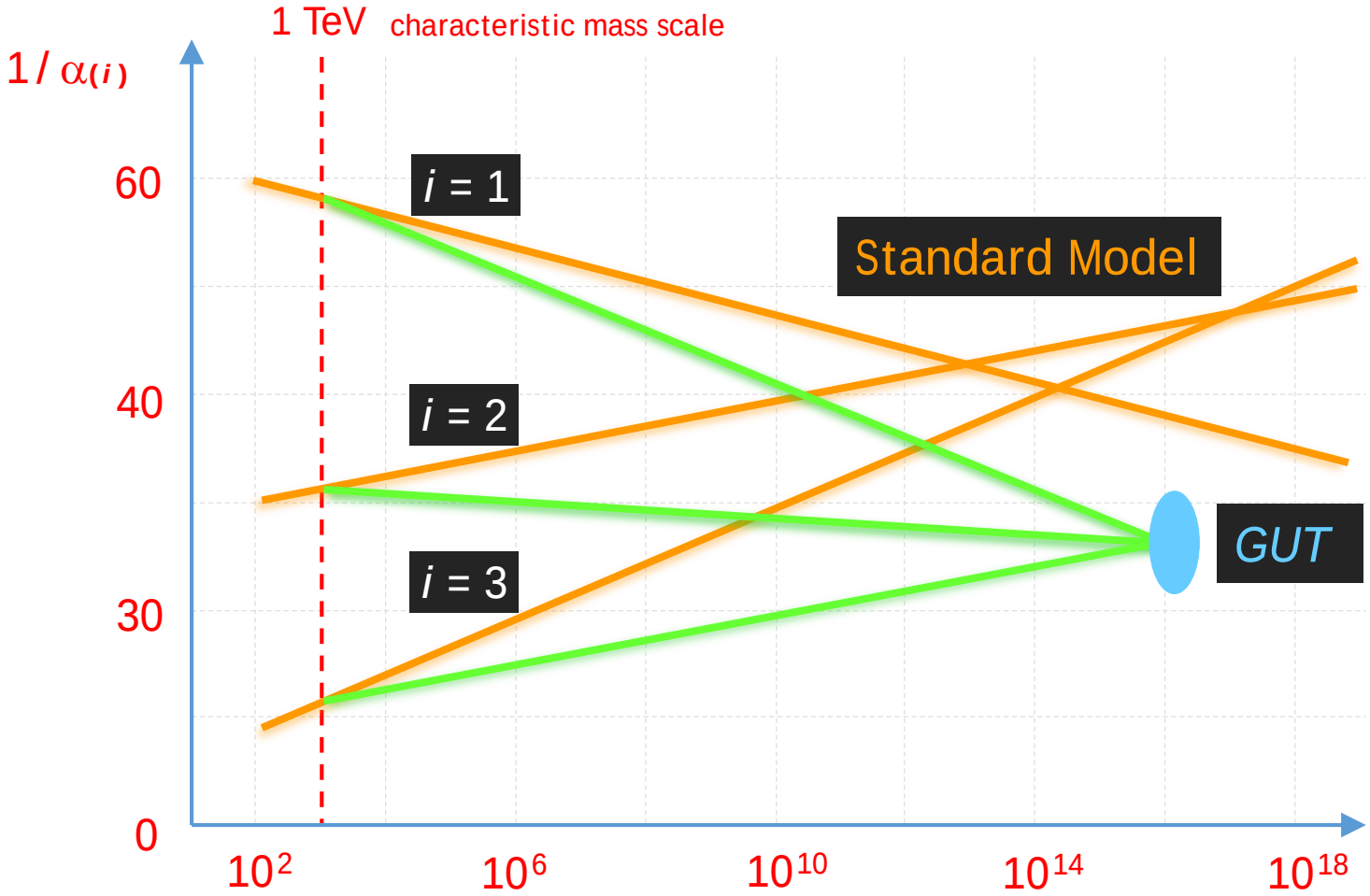


Among other basic knowledge we were(are) seeking in Particle Physics



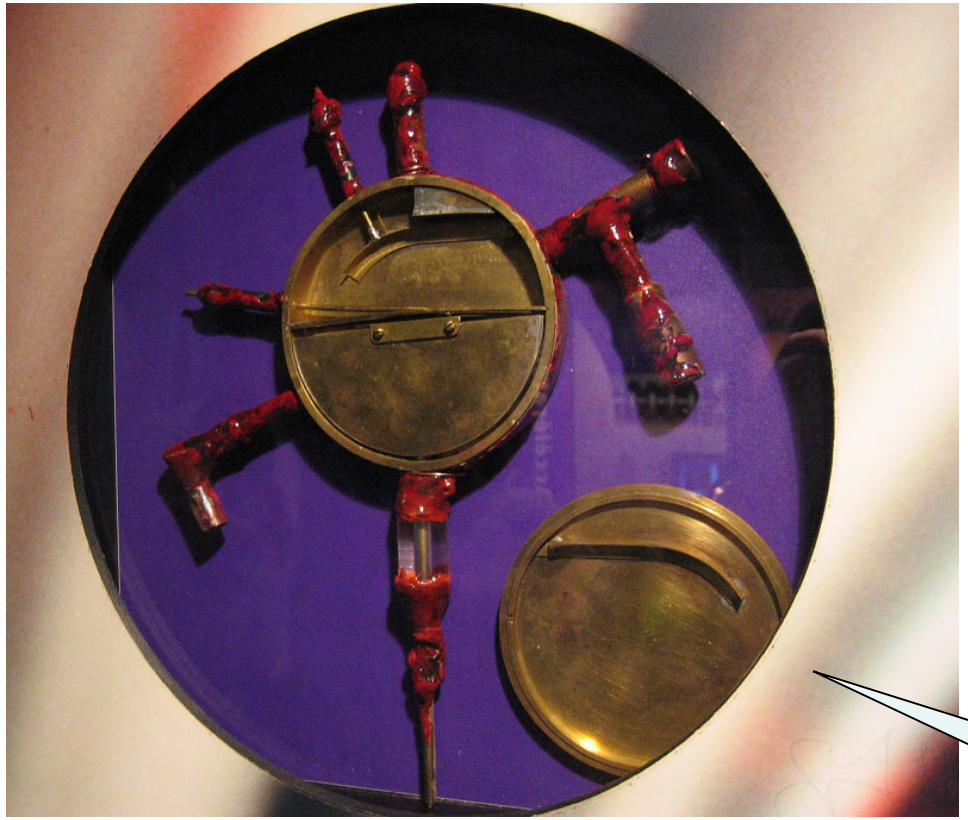
Mexican Hat → Higgs boson





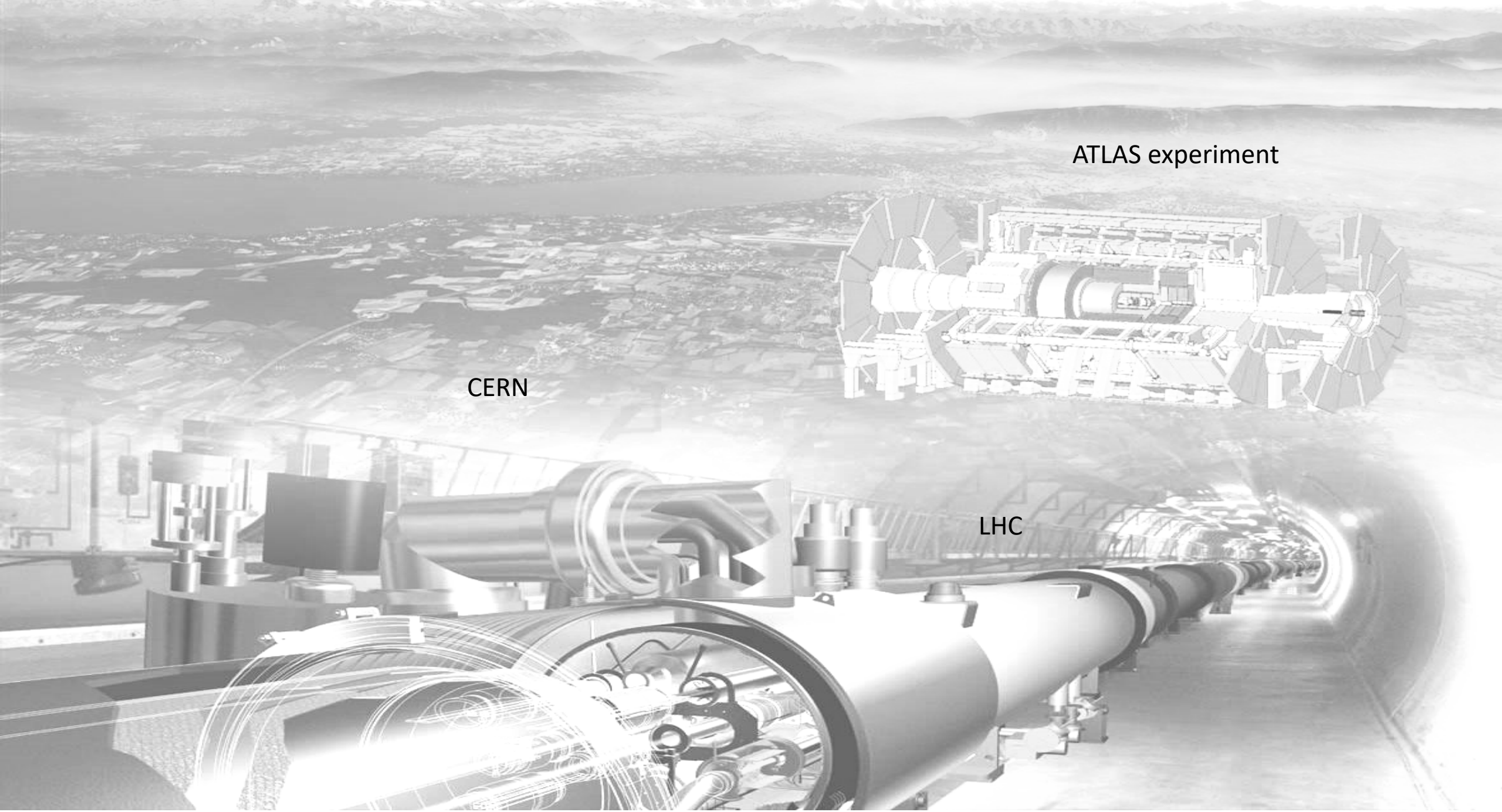
Theory of everything

Particle Physics on accelerators



Physicists passed a long way
from the table-top accelerators like the first cyclotron invented and built for about 25$ by Ernest Lawrence in 1930
towards huge accelerators for about 1 G$ hidden under the landscape like LHC at CERN ...

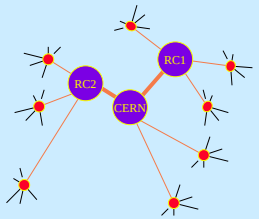
Replica of Lawrence's cyclotron at CERN Microcosm


ATLAS experiment
CERN
LHC

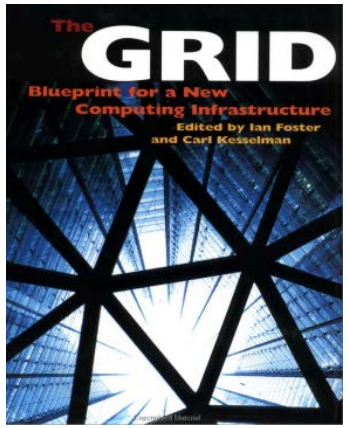
ents,at the limit of the current technology

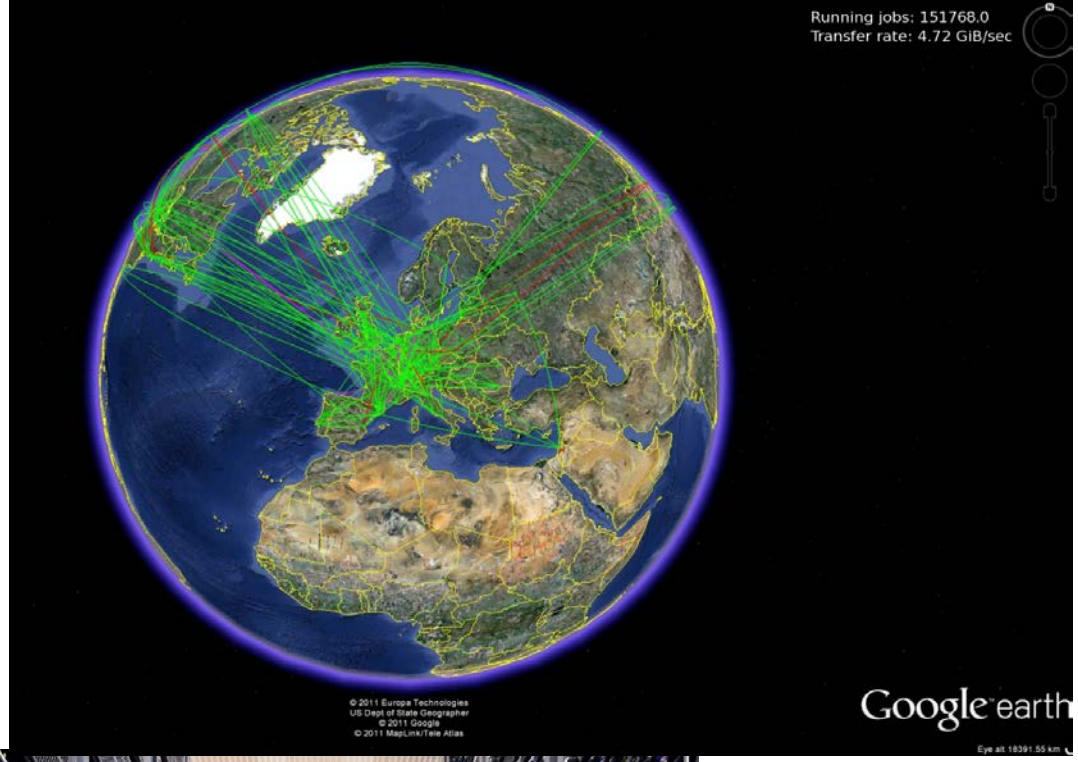
From

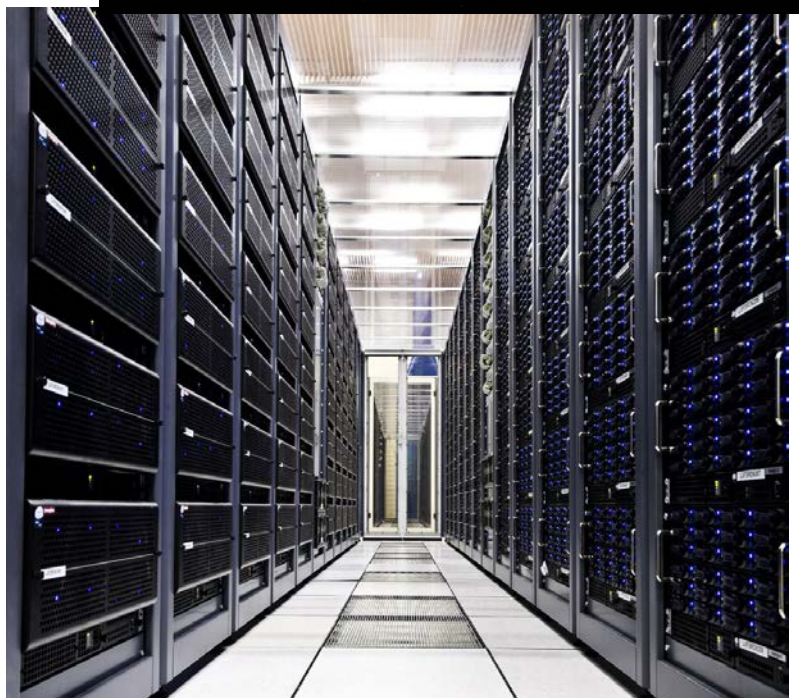
- Partially decentralized model
  - replicate the event data at about five regional centres
  - data transfer via network or movable media

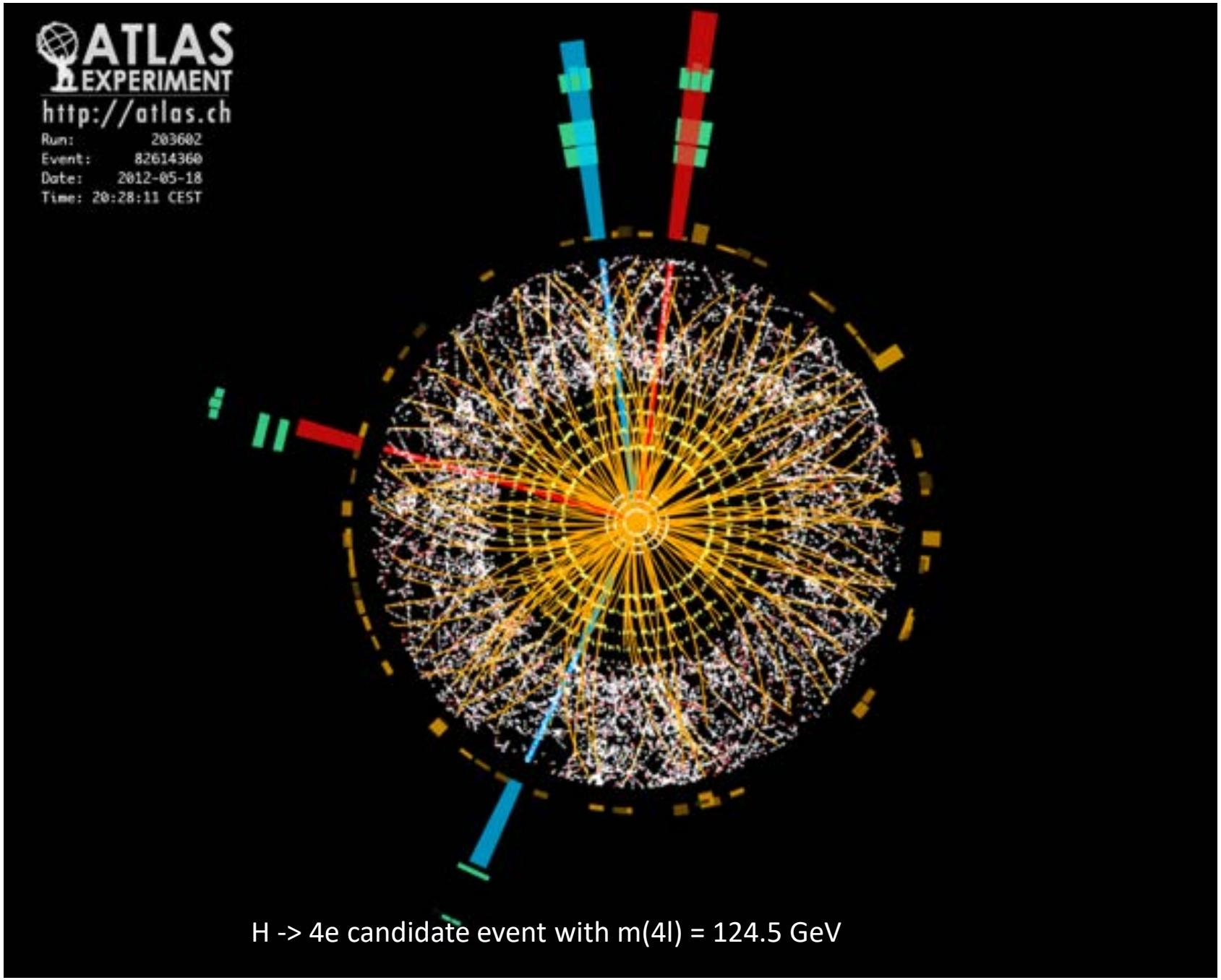


to









H -> 4e candidate event with m(4l) = 124.5 GeV

18-May-2012, 20:28:11 CEST

From raw data to physics

Machine learning

Raw data

Convert to physics quantities

Detector response

apply calibration, alignment

Interaction with detector material

Pattern, recognition, Particle identification

Fragmentation Decay

Physics analysis

Basic physics

Results

Reconstruction

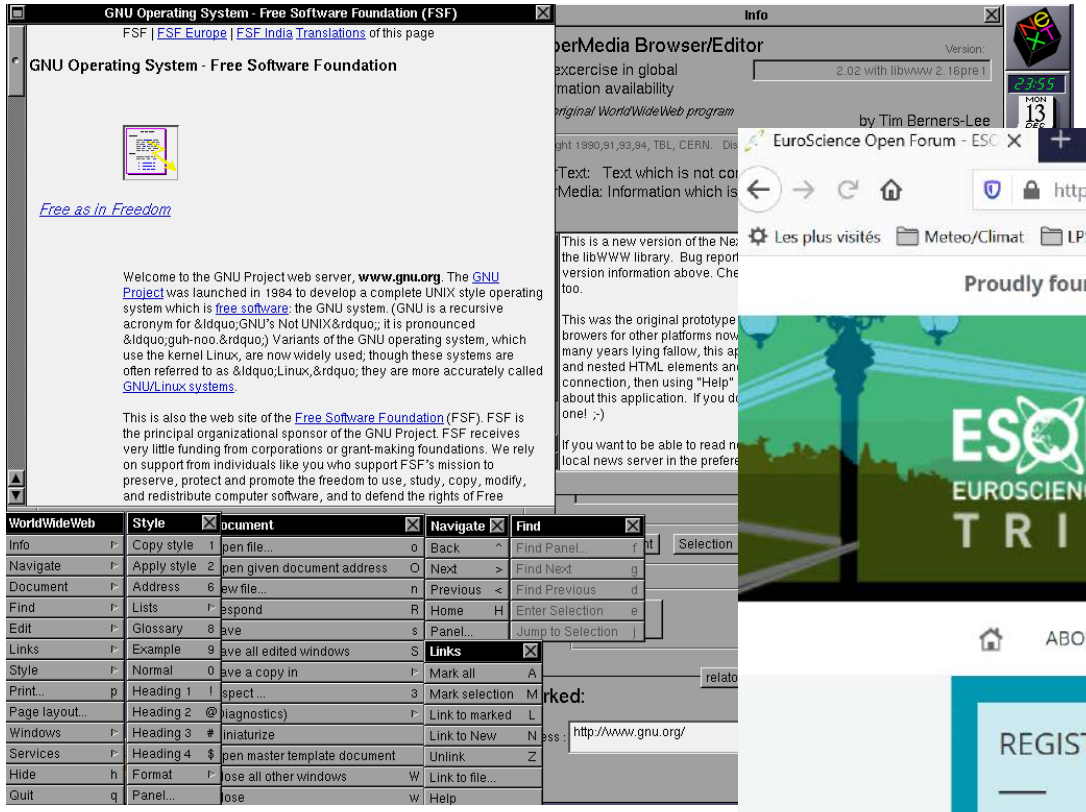
Simulation (Monte-Carlo)

Analysis

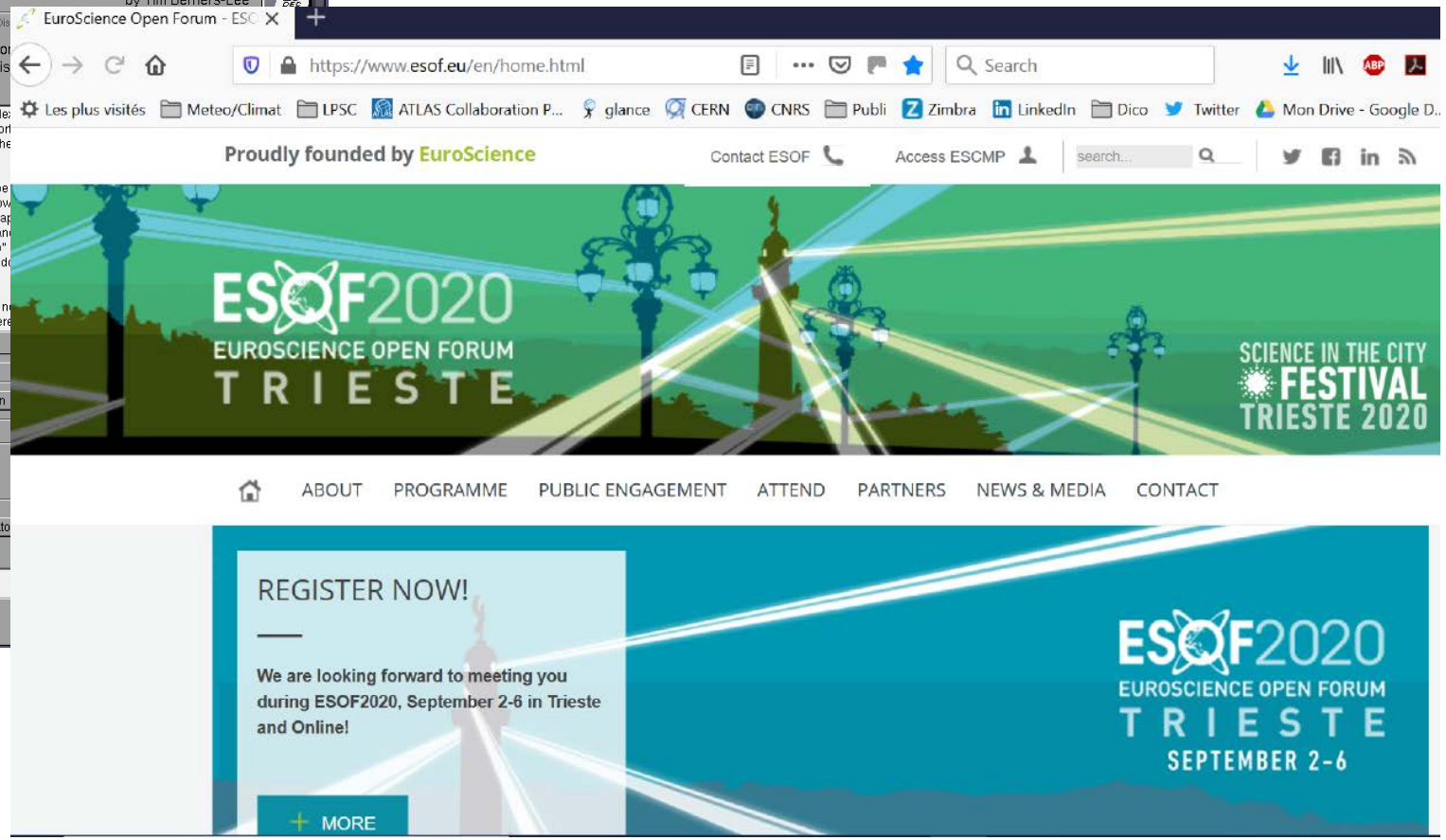
Calibration Reconstruction Analyse

Most Famous spin off -WWW

~1990s



~Nowadays



Synchrocyclotrons (proton therapy) or Gas Electron Multipliers

Two other known spin-offs

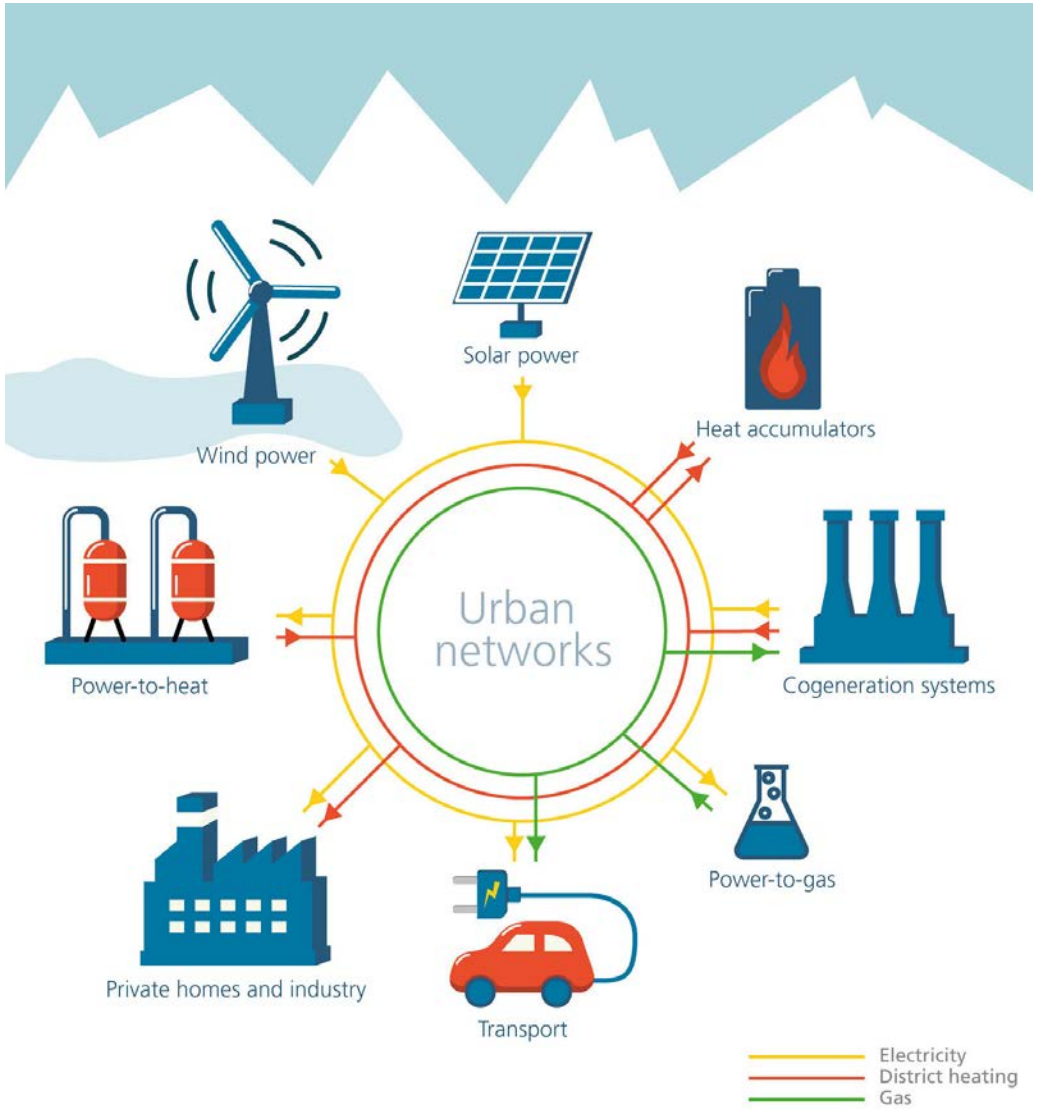
Back in the 1970s, CERN engineers developed an early **touchscreen and tracker ball device** for use on their Super Proton Synchrotron (SPS).

More on « renewable fundamental » physics research and possible solutions for a free « CO_2 » planet

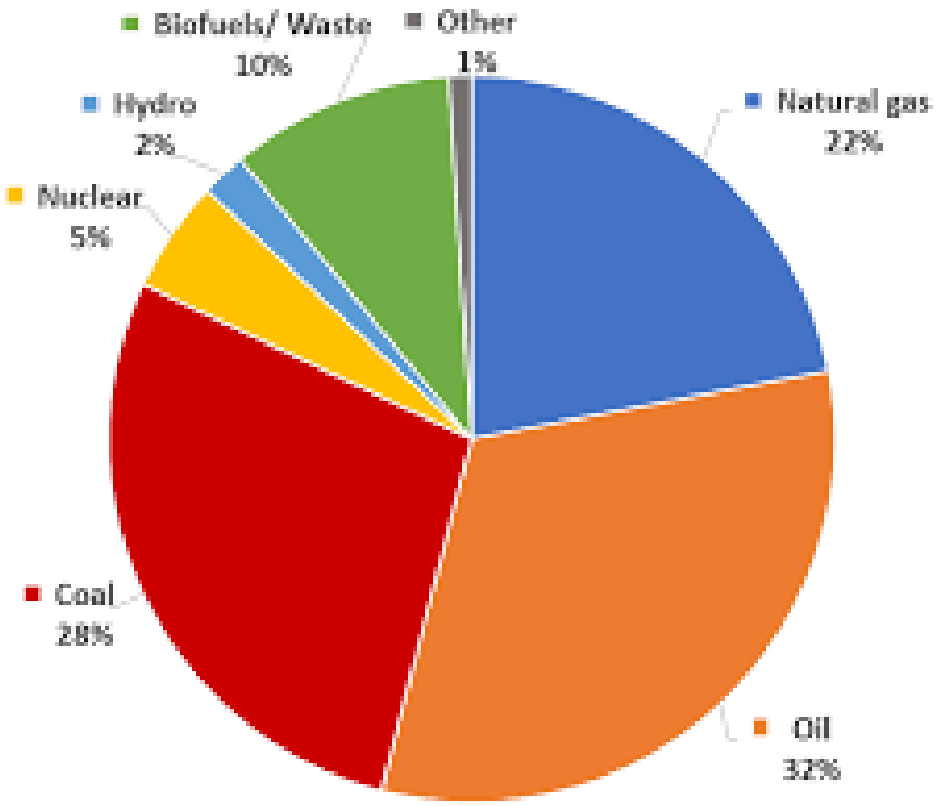
Many other topics can be of interest to HE physicists

Climate change

Energy and Heat production

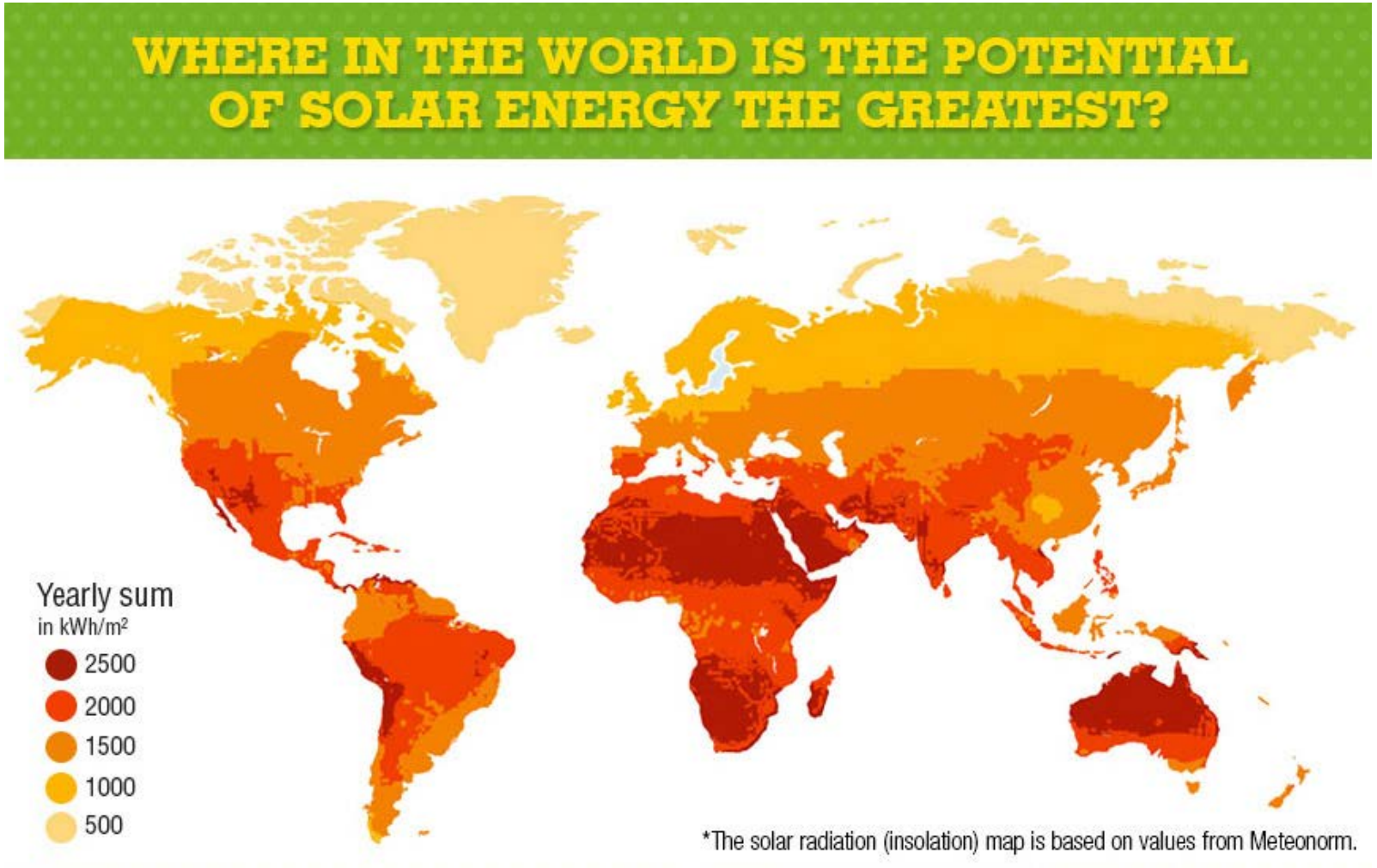


Renewable energies such as Solar energy is very promissing



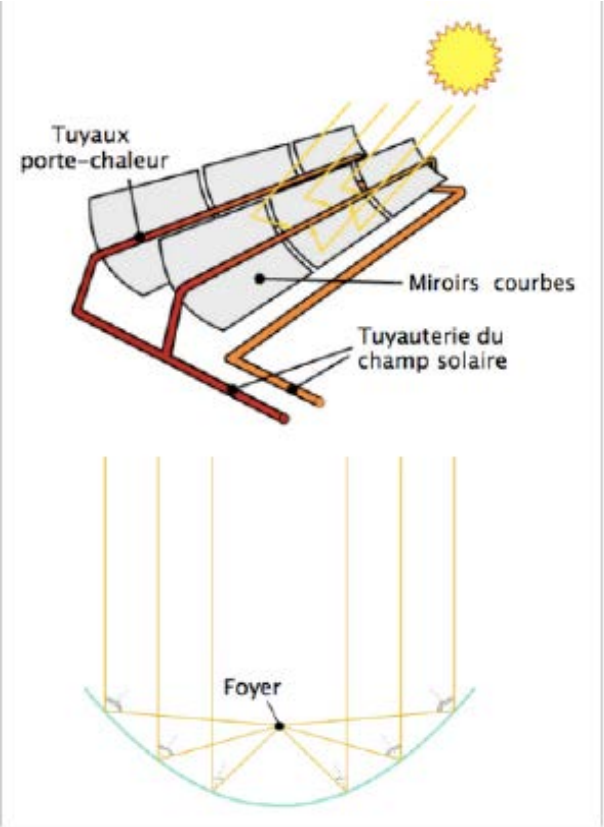
Radiance – Insolation

radiance is the amount of light incoming to a point from a single directions, density of radiant flux per unit of surface area and unit of solid angle. → *radiative intensity*



https://solcast.com/solar-radiation-map/#global

NOOR Ouarzazate solar plant



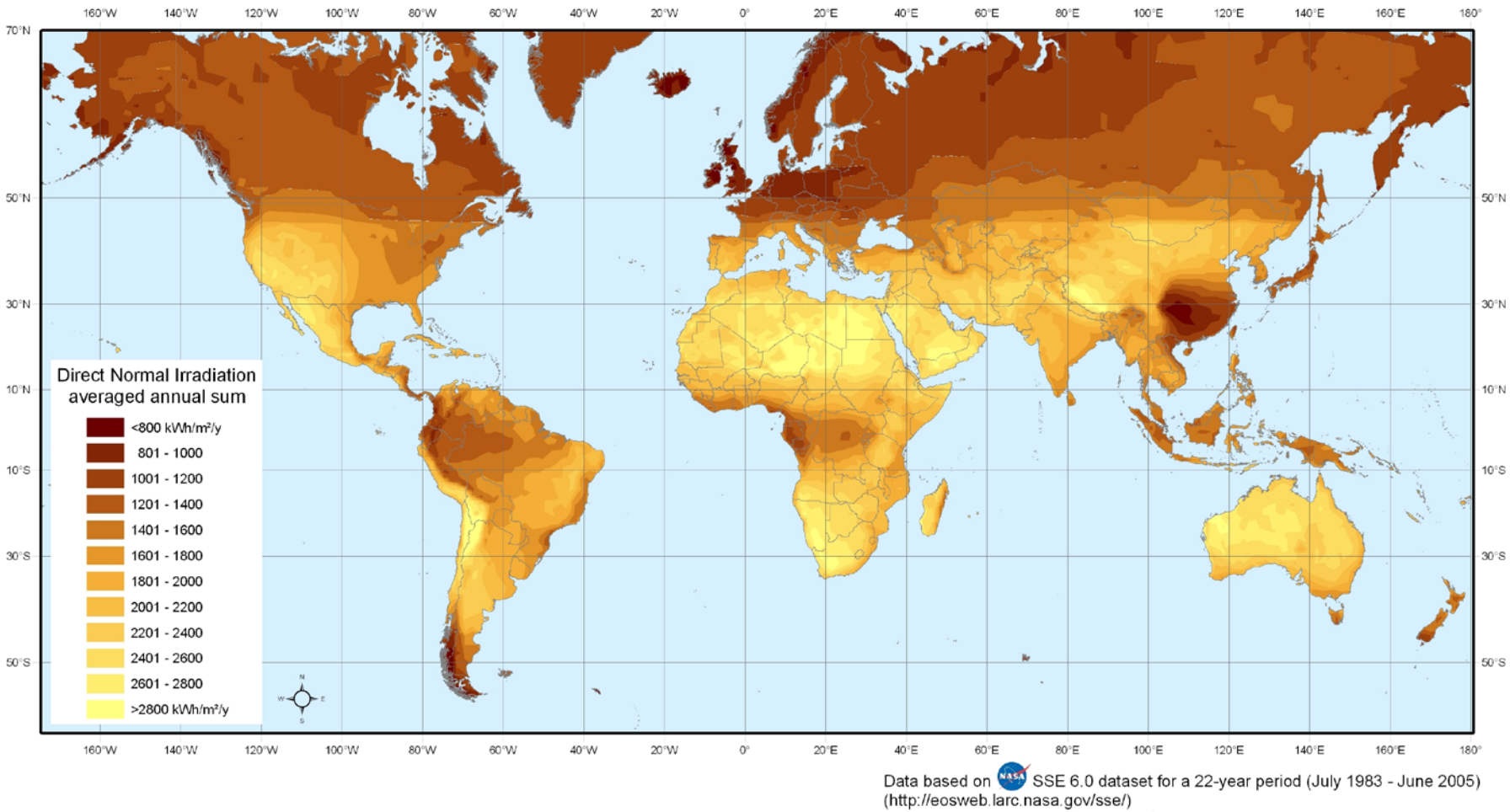
Electricity – Energy production

Solar spectral Irradiance- Energy Flux (kWh/m^2/y)

irradiance is the amount of light incoming to a certain point from possibly all directions

→ *radiative heat flux*

Direct Normal Irradiation (DNI)

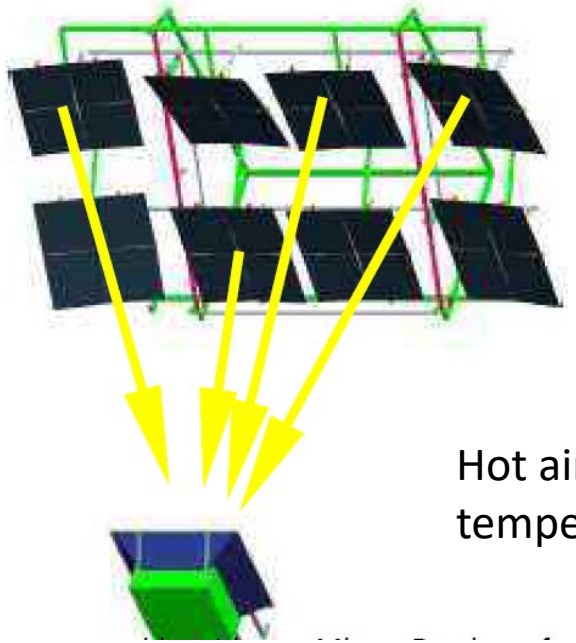


https://solcast.com/solar-radiation-map/#global

From 2nd map(Irradiance) → Renewable heat energy character technology with linear mirrors

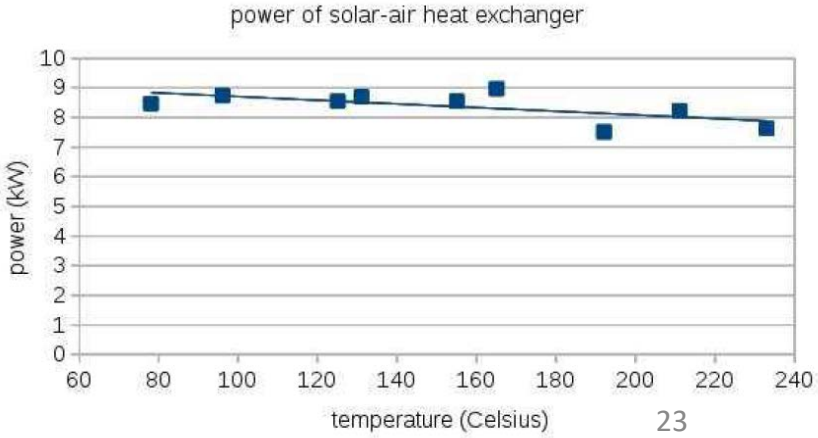
Development and Test of a New Solar-Air Heat Exchanger for the Linear Mirror II System, Hans Grassmann, Marco Citossi, Smart Grid and Renewable Energy, 2019, 10, 155-164

www.isomorph-production.it



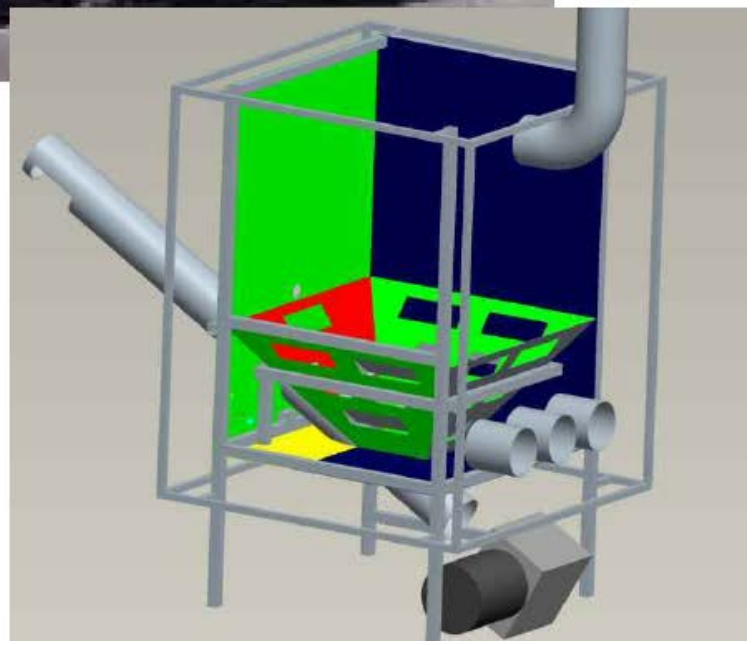
Hot air at High temperature

Heat exchanger at a fixed position



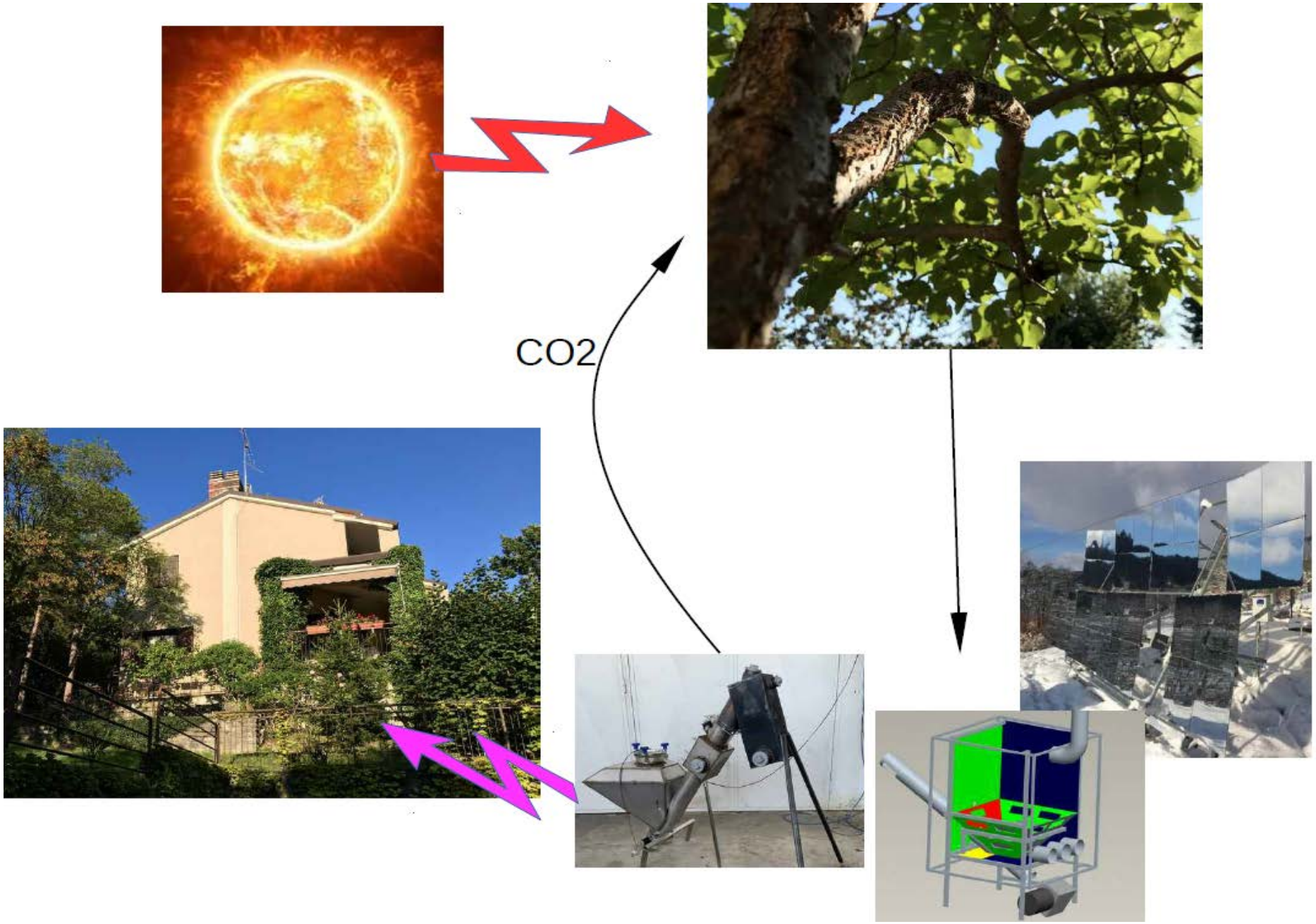
hot air is used to roast waste biomass

toaster



Solar energy for roasting simple biomasses

→ Solar carbon, a high quality combustible which can substitute fossil fuels



Gasifier → eolipile study project (D. Kobor et al. (Senegal)

Helsinki Energy Challenge

The climate crisis is the most crucial challenge of our time, and cities have a key role in driving the shift to a low-carbon economy. Helsinki is one of the leading cities in the transition towards a sustainable future, with the goal of becoming carbon-neutral by 2035. But there is an issue to overcome. Currently, more than half of the city's heat is produced with coal. In order to achieve carbon-neutrality, we need radically new solutions to meet Helsinki's heat demand. And we are not alone. To fight climate change, sustainable heating solutions are needed in cities all over the world. Heating not just beyond coal, but also beyond burning biomass.

That is why we are launching the Helsinki Energy Challenge.

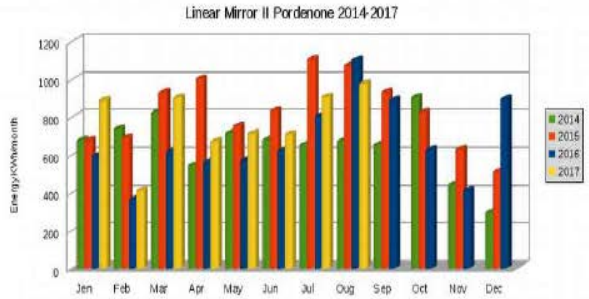
A global one-million-euro challenge competition to answer the question: How can we decarbonise the heating of Helsinki, using as little biomass as possible?

Helsinki Energy Challenge timeline 2020–2021

27 Feb–30 Sept 2020	Application phase
April–September	Helsinki Energy Challenge webinars and other events
By 14 September	All clarifying questions and answers are published on the Challenge website
30 Sept 16:00 EET	Deadline for the Challenge applications
6 November	Finalist teams invited to the co-creation phase
11 November	Orientation webinar for the finalist teams
9–11 December	Boot camp in Helsinki
22 January 2021	Deadline for the finalist teams to submit their final competition entries
February 2021	Winner(s) selected by the international jury
March 2021	Awards ceremony, Helsinki

As an example

The first Linear Mirror was installed in 2014 at the hotel "Il Cavaliere" at Pordenone (Italy). The owner is very satisfied, the installation can be visited. Its performance has been published.



The installation has been working by now for 6 years, without problems, and can be visited.

Conclusion and prospects

Helsinki project and beyond

Main project leader: Hans Grassman (Udine Univ.)

Collaborators:

Ketevi Assamagan (BNL, USA)
Marina Cobal (Udine Univ.)
Joseph Diatta (Zighinchor Uni., Senegal)
Daniel Egbe (ANSOL coordinator and Linz Univ.)
Diouma Kobor (Zighinchor Uni., Senegal)
Fairouz Malek (CNRS, France)
Serigne Thiao (Zighinchor Uni., Senegal)

Solutions for a free « toxic CO_2 » Planet:

- Isomorph: www.isomorph-production.it
- Helsinki Project
- Eolipile study and design project
- Ansole network
- Africa Solar entrepreneurship

→ Applied to Solar ImpulseFoundation: Boosting the adoption of profitable solutions to protect the environment: https://solarimpulse.com/

Conclusions

- The needs to fight against CO_2:
  - Open mindness
  - Overcoming intellectual and Cultural boundaries
  - In the spirit of ESOF : Science in the city

- It was an opportunity to build an international team

to serve society involving academics, industrials, stake holders and policy makers