

ENGINEERING IN PARTICLE PHYSICS

OLIVIER CALAY-ROCHE¹, ROBERT KRISZTIAN BAGOSI², HILDE KLETZL³, BØRGE IRGENS⁴, ANA B PRIETO⁵

¹ EDUCATION NATIONALE, ACADÉMIE D'AIX-MARSEILLE, FRANCE | OLIVIER.CALAYROCHE@AC-AIX-MARSEILLE.FR

² GÖNDÖCS BENEDEK KÖZÉPISKOLA, GYULA, HUNGARY | RBAGOSI@GMAIL.COM

³ HTBLUVA SALZBURG, UNIVERSITY OF PEDAGOGY SALZBURG, AUSTRIA | HILDE.KLETZL@HTL-SALZBURG.AC.AT | HILDE.KLETZL@PHSALZBURG.AT

⁴ ANDØY VIDEREGÅENDE SKOLE, ANDENES, NORWAY | BORIRG@VGS.NFK.NO

⁵ CEI SAN IGNACIO, JUNÍN DE LOS ANDES, ARGENTINA | ANABEATRIZPRIETO@GMAIL.COM

CURRICULUM & CLASSROOM CONNECTIONS

Physics concepts	Technologies
Electrical field	Accelerating cavities
Voltage, current, power consumption	Electrical power systems
Resistance, superconductivity	Superconducting magnets
Magnetic field strength and lines, Lorentz force	Electromagnets and superconducting magnets
Reflection, refraction and total reflection	Optical fibers
Pressure	Vacuum systems
Temperature and heat	Cooling systems
Frequency	Radiofrequency and signals
Force, Torque and mechanisms	Electro-Mechanical and Civil engineering structures

KEY IDEAS

- Introducing superconductivity,
- Its applications,
- Engineering aspects of superconducting magnets in the classroom
- Superconductivity is not mentioned in curricula
- Teaching superconductivity with resistance

KEY IDEAS

- What is superconductivity?
- Engineering challenges for superconductors :
 - Finding the best materials for the wires,
 - Cooling the whole system,
 - Powering the installation,
 - Managing the material contraction during the cooling,
 - Controlling the forces at work during operation.

POTENTIAL STUDENT CONCEPTIONS & CHALLENGES

- Engineering
- Superconductivity



Yosemite

HELPFUL MATERIALS AND RESOURCES

Video



https://www.youtube.com/watch?v=x6OhDE_AYaw

HELPFUL MATERIALS AND RESOURCES

Experiment



<http://www.coolmagnetman.com/magsuper.htm>

HELPFUL MATERIALS AND RESOURCES

Applications devices



<http://acceleratar.uk/>



← 🔍 ⋮

Superconductors
Kirill Sidorov
3 PEGI 3

DESINSTALAR **ABRIR**

Contiene anuncios • Compras integradas

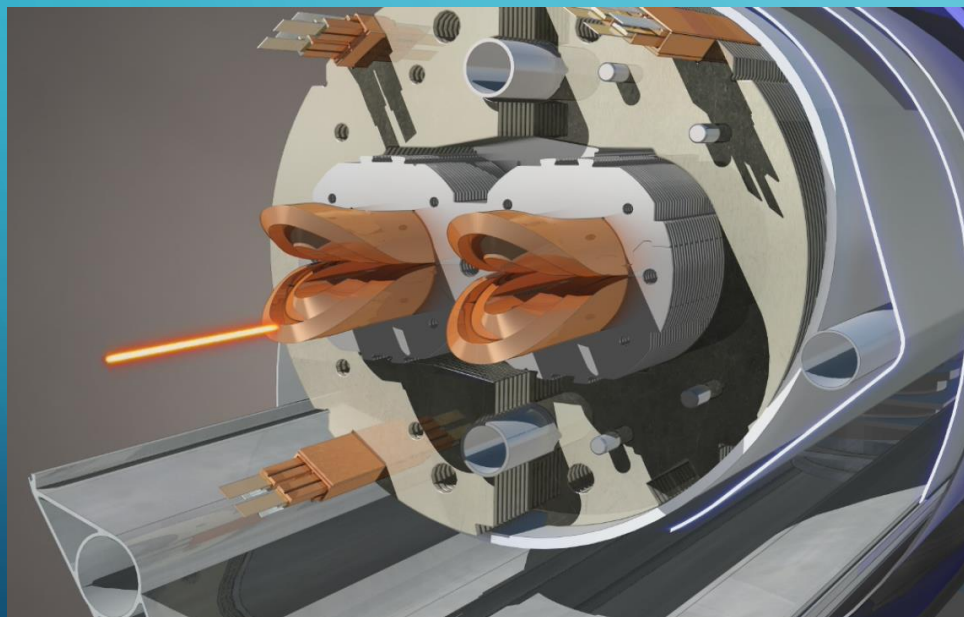
100 Descargas 4.6 7 ⭐ Libros y referencias Similares

Directorio de los superconductores

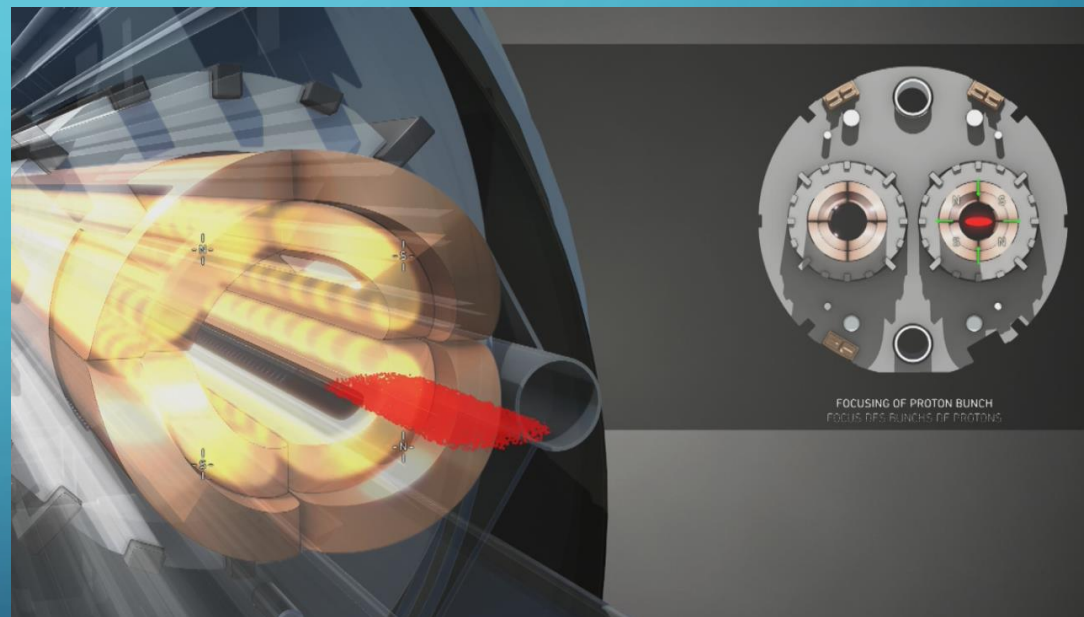
https://play.google.com/store/apps/details?id=com.do_apps.catalog_258

HELPFUL MATERIALS AND RESOURCES

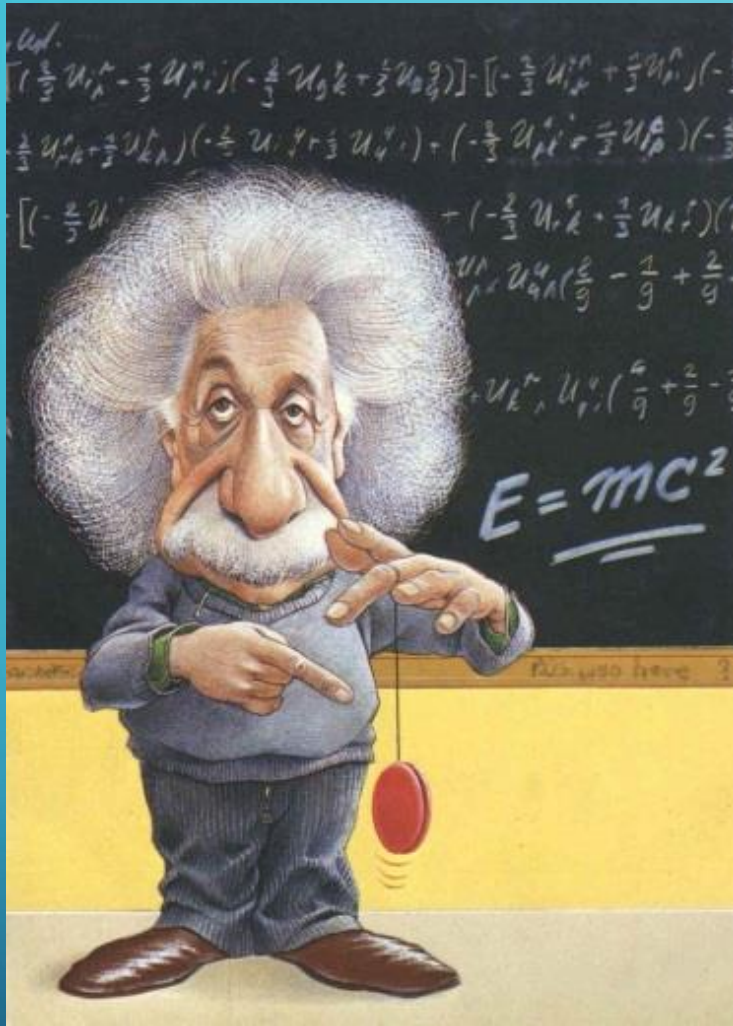
Animation



<https://cds.cern.ch/record/1709735>



<https://cds.cern.ch/record/1709736>

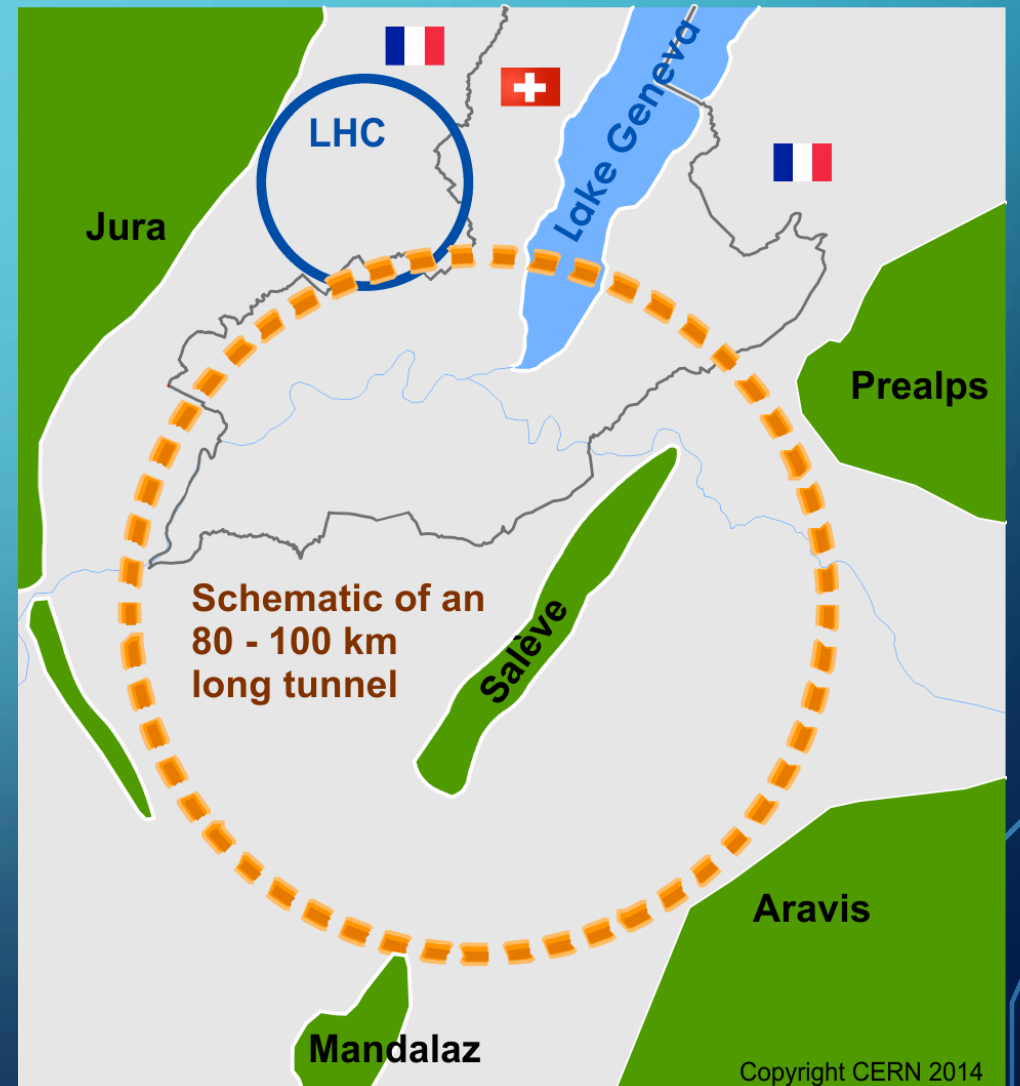


WHAT DOES AN ENGINEER DO AT CERN?

CIVIL ENGINEERING - TUNNELS



Eurotunnel 50 km



PICK AND CHOOSE ACTIVITY

electrical engineering / material design - materiology / mechanical engineering / electronics / civil engineering

tunnel, superconducting electrical magnets, cranes to move heavy machines, electronic detectors, crystals for detectors, wires made of superconducting materials, coils for motors, pumps for cooling systems, electronic devices checking on the running machine.

The background is a solid teal color with a subtle gradient. In the four corners, there are decorative white line-art elements resembling circuit traces or neural network connections, with small circles at the end of the lines.

THANK YOU FOR YOUR ATTENTION

Any questions ?

IDENTIFY

