

# Why physics?

June 2016

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# What is a Physicist?

→ google search

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https://www.google.com/search?q=physicist&biw=1873&bih=983&source=lnms&tbm=isch&sa=X&ved=0ahUKEwiT1fLzLzNAhUBXGMKHRmFapYQ\_AUIBigB

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The search results grid contains numerous images related to physics. It includes portraits of famous scientists like Albert Einstein, Stephen Hawking, and Max Born. It also features images of scientists in laboratories, people writing equations on chalkboards and whiteboards, and various pieces of scientific equipment. Some images include mathematical formulas such as  $E=mc^2$ ,  $V=\sum P_i V_i$ ,  $V=V_0 - \sum V_{r,i}$ ,  $R_{ik} = 0$ ,  $\psi(x) = C e^{ikx} + D e^{-ikx}$ ,  $A+B=C+D$ ,  $kx - Bk = C\beta - D\beta$ ,  $\chi = -\frac{1}{4} F_{\mu\nu} F^{\mu\nu} + \bar{\psi} \not{D} \psi + \bar{\psi} \psi + c.c.$ ,  $\chi = \psi_1 \psi_2 \phi + c.c.$ ,  $\chi = -\frac{1}{4} F_{\mu\nu} F^{\mu\nu} + \bar{\psi} \not{D} \psi + \bar{\psi} \psi + c.c.$ , and  $\chi = \psi_1 \psi_2 \phi + c.c.$ . A quote by Albert Einstein is also present: "Gravitation cannot be held responsible for people falling in love. How on earth can you explain in terms of chemistry and physics so important a biological phenomenon as first love? Put your hand on a stove for a minute and it seems like an hour. Sit with that special girl for an hour and it seems like a minute. That's relativity." (Albert Einstein) iquotes.com



# the BIG BANG THEORY

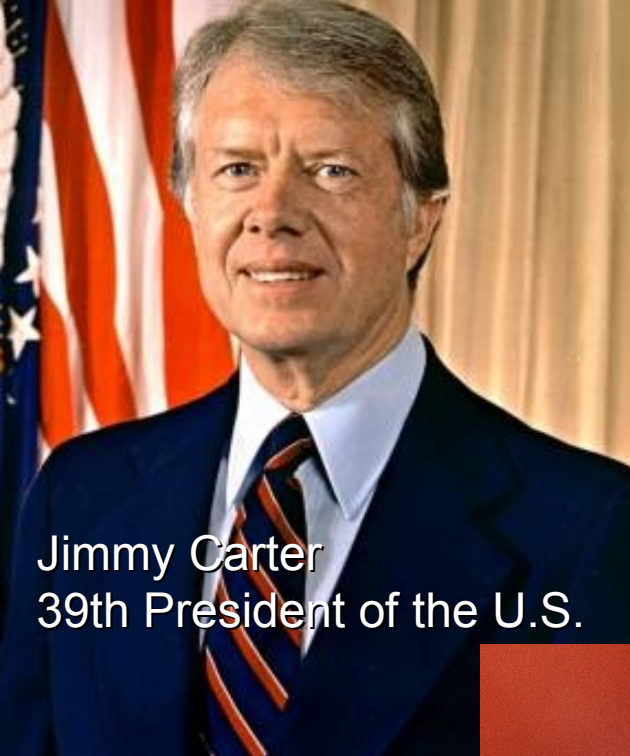
Spigot



**A lot of normal(?) people are  
into Physics.**

**Everybody likes to  
understand how stuff works,  
don't you think so?**

**Major requirement: curiosity**



Jimmy Carter  
39th President of the U.S.



Elon Musk  
SpaceX, Tesla, Paypal



Sally Ride  
youngest astronaut



Carl Sagan  
science  
communicator



Brian May  
Queen guitarist



Angela Merkel  
German Chancellor

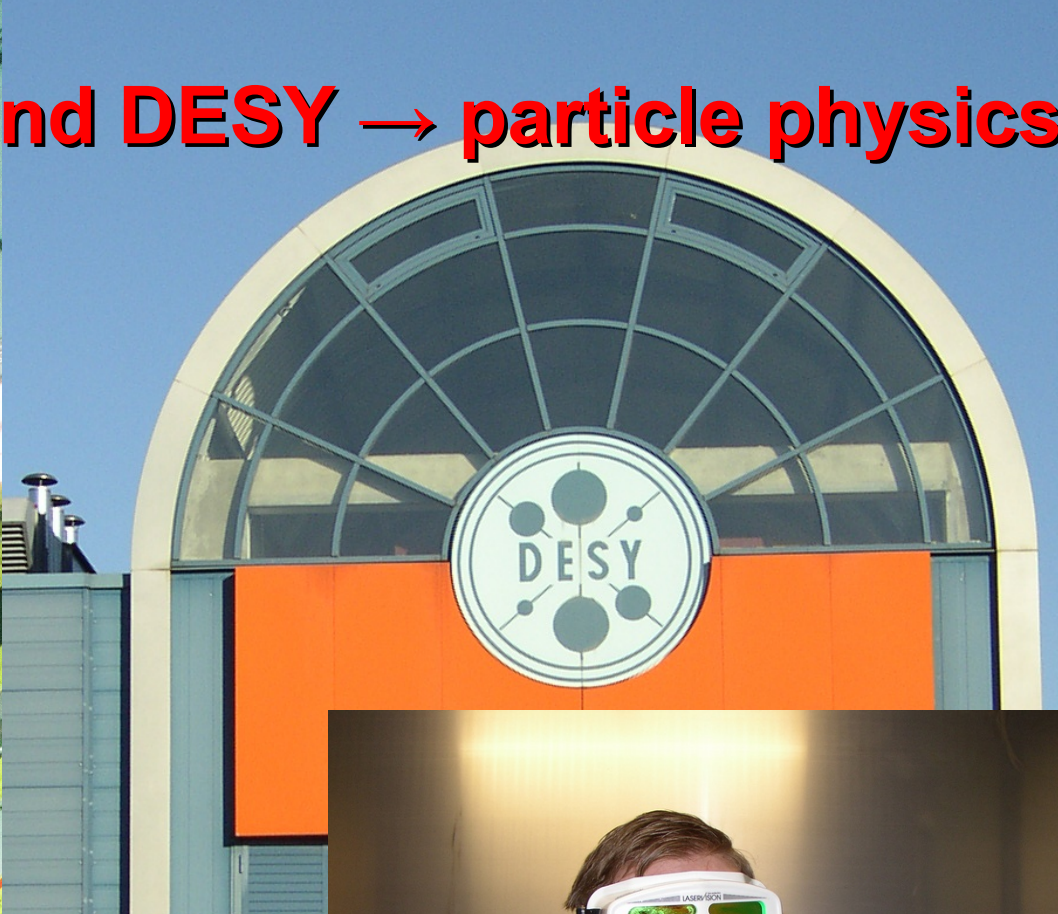




**Excursion in high school to DLR (German NASA)  
→ saw early work on Rosetta (comet lander)**



# Excursion to CERN and DESY → particle physics



# What keeps me going

**stuff we know**

**stuff we don't know:  
dark matter**

**→ makes  
me curious!**

**Dark Matter:**

***We know it's there!***

**Otherwise our whole Universe  
would look different.**

**So far: no proof for what it is  
exactly! :-)**

# Now what?



**Why not ask somebody who has been there and runs fast?**



**Runners telling us  
about Dark Matter  
could be *cosmic rays***

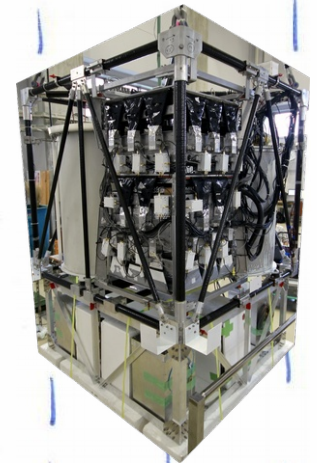
# ?Cosmic rays - What is that?

It can get pretty violent out there,  
which can produce all sorts of things!

for example: protons and electrons  
(the matter we are made of)

# Where to put such an experiment?

Imagine you wanted  
to collect rain...



**The atmosphere acts as a  
roof for cosmic rays**

**atmosphere**



***Which is good to stay  
healthy, but bad to  
measure cosmic rays***



**when you are hiking  
at high altitudes**

**→ you are exhausted  
much faster**

**→ because there is  
less air to breathe**

**→ roof for cosmic  
rays is getting weaker**



# Experiment *in Space*



# AMS-02 on the launchpad



# Integration of AMS-02 at CERN with STS-134 astronauts



MW

PvD

AG

Mark E. Kelly

Gregory H. Johnson

Andrew J. Feustel

Gregory E. Chamitoff

Roberto Vittori

TK

Edward M. Fincke

Samuel C. C. Ting



***Space is great, but super expensive  
(\$1,000,000 for 2lbs)***



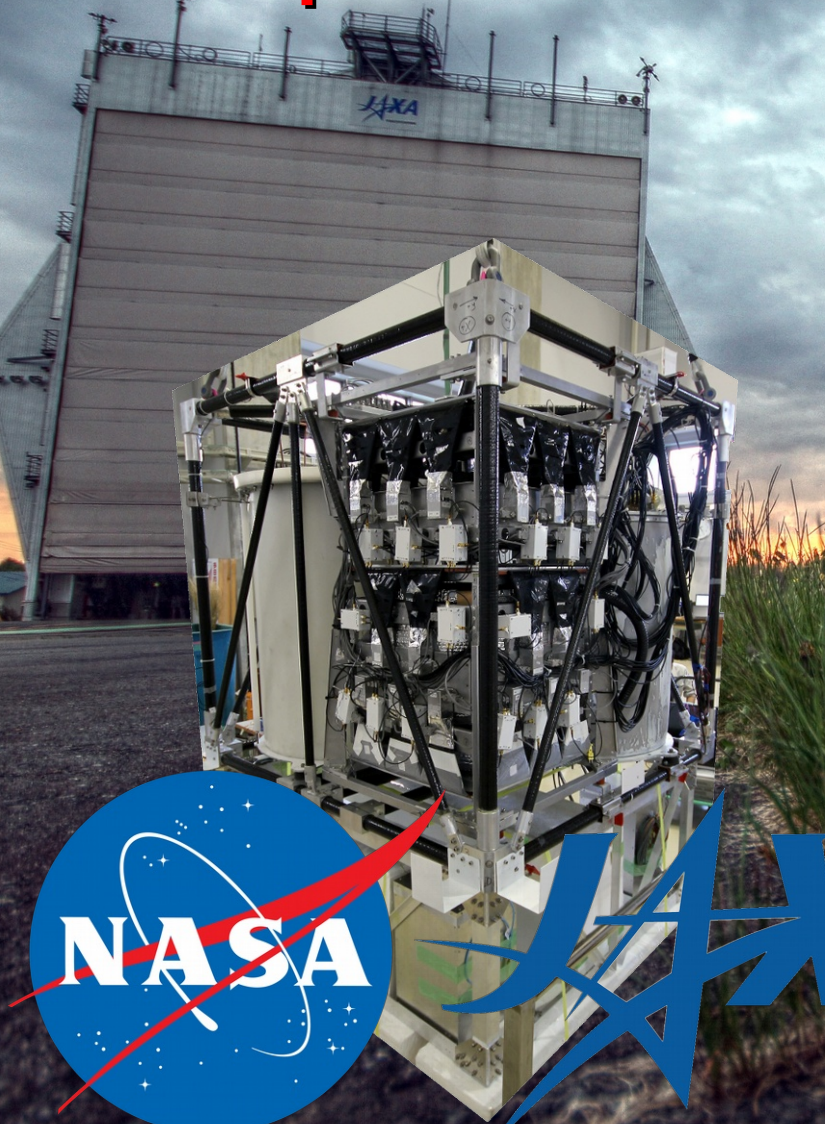
**use balloons**

**that go up very very high**

**→ 25 miles above ground**

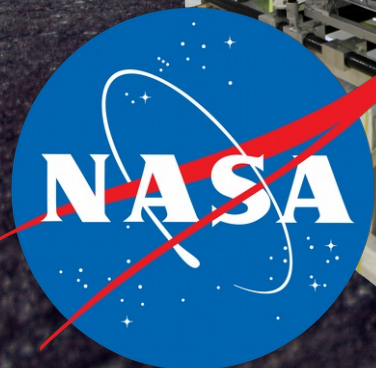


# **GAPS balloon experiment launched from Japan**



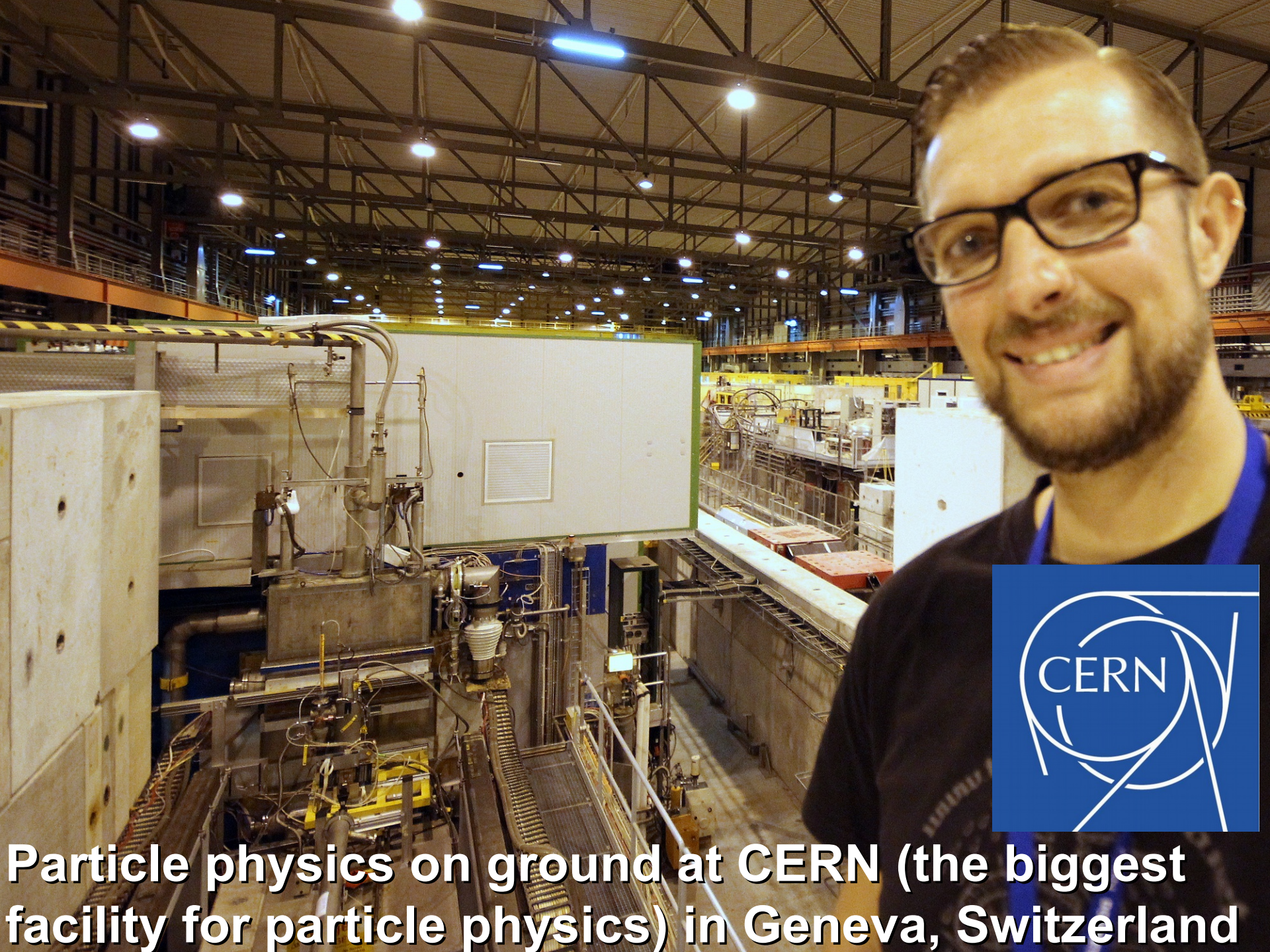
***A lot of hands  
on work with all  
sorts of different  
tasks!***

***Playground for big  
kids***





2012:06:03 02:29:14



**Particle physics on ground at CERN (the biggest facility for particle physics) in Geneva, Switzerland**





***Lots of open questions out  
there!***