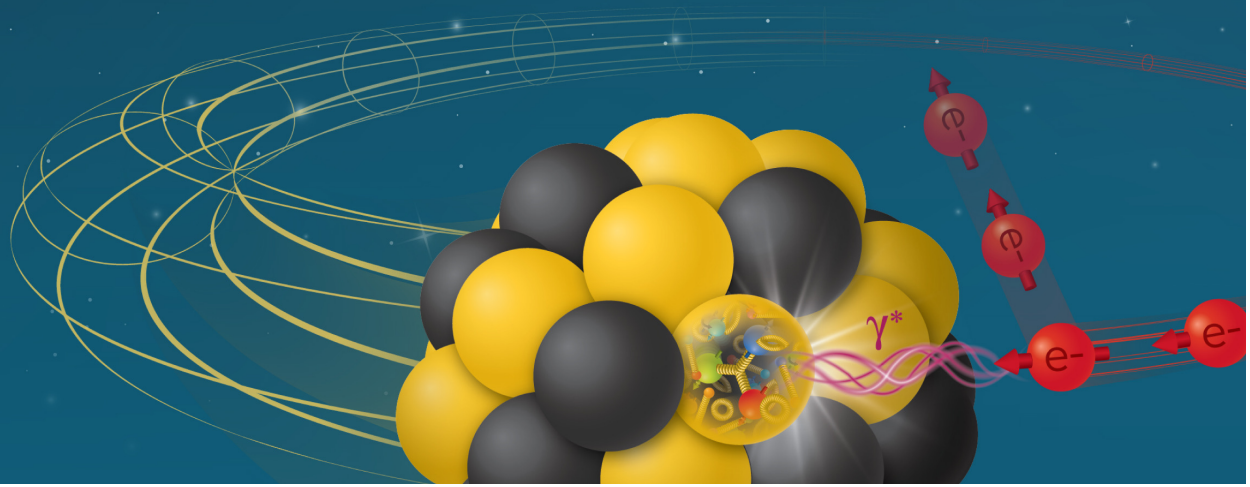
Possibili attività di outreach in Italia and elsewhere

Marta Ruspa (Univ Piemonte Orientale & INFN Torino)

Giornate Nazionali EIC-NET
Bologna, 27-28 giugno 2024



Electron-Ion Collider ePIC

To whom?

- General public, high school students, kids
- University students

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Why?

- Recruitment and motivation of a new generation of student, master, phD
- «Brand identity»

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Why?

- Recruitment and motivation of a new generation of student, master, phD

  - Summer schools (INFN, INFN-DOE, CFNS)

- «Brand identity»

How?

- Masterclasses
- Festivals (NdR, Genova, Bergamo, Futuro Remoto,…)
- Podcasts
- Gadgets
- Social media
- Link to CC3M
- Contests

ITALIAN AND INTERNATIONAL

Masterclasses

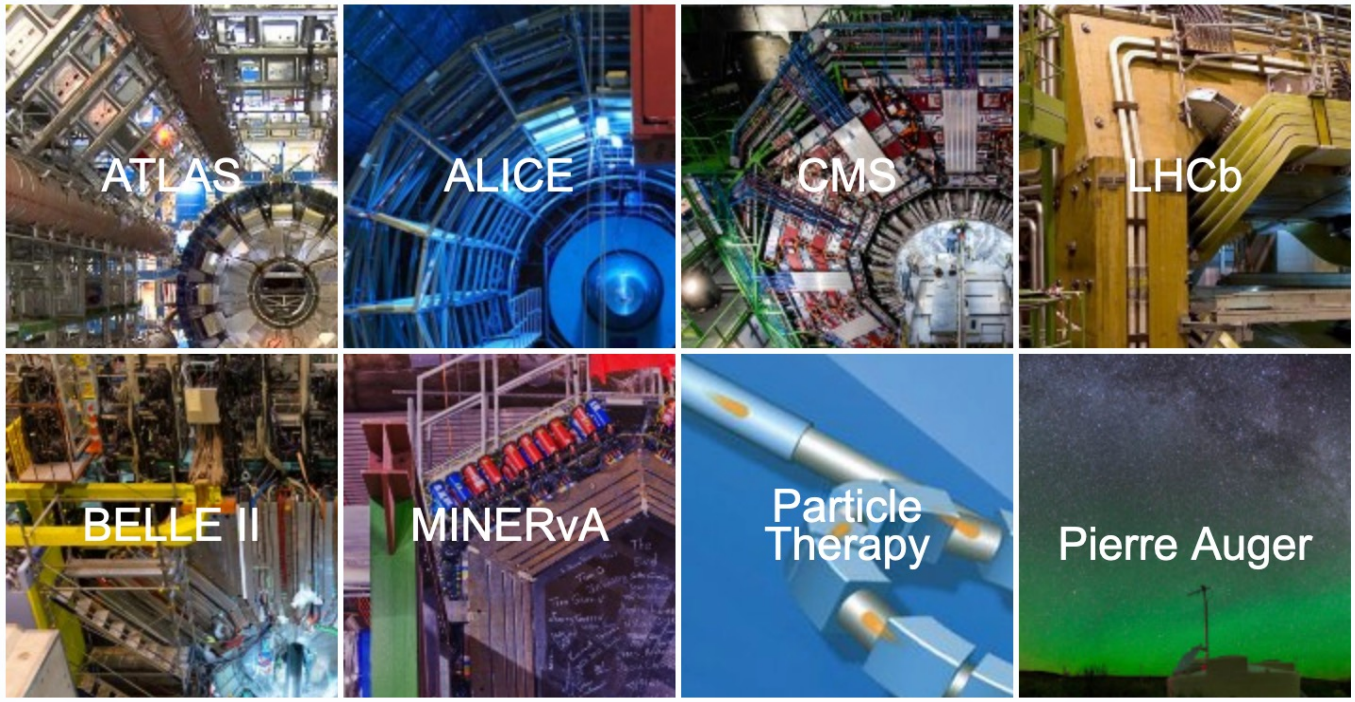
IPPOG International Masterclasses

Masterclasses promoted by the International Particle Physics Outreach Group (IPPOG)
https://physicsmasterclasses.org/

Different topics related to various experiments

Each year
- 33000 high school students
- 60 countries
- 225 universities

The students attend a full day event in a nearby university



Masterclass format

The Masterclass format is tipically based on

- a few seminars on basic physics and on the concerned experiment in the morning
- a hands-on session in the afternoon
- a joint discussion of the results in video conference with all the participating institutes at the end of the day

The hands-on session is carried out on a desktop or laptop computer, ideally one for each student. A simulation/reconstruction software allows the students to perform an exercize – based on real or simulated data.

Could an ePIC Masterclass be started?

In Italy IMC are coordinated by INFN – any initiative will have to go formally through CC3M

The following is just an informal investigation for the time being

Could an ePIC Masterclass be started?

- Preso contatti con IPPOG – invito a partecipare al prossimo meeting a fine novembre
- Non sussiste il problema di un esperimento non-CERN

«Not being a CERN experiment is absolutely no problem, on the contrary, > IPPOG is for all. We have Auger, Belle, neutrinos from FNAL... and the list can easily become longer: a **BNL based contribution would be excellent**. The US activities are also very strong thanks to our long term partnership with Qarknet»

- In contatto con i coordinatori del progetto International Masterclass (IMC),

Se lo riteniamo opportuno possiamo fare da trigger a questa iniziativa che ovviamente va condivisa con INFN e con la collaborazione EPIC. Elke ne aveva già fatto cenno all'RRB meeting di Roma ma all'epoca non avevo ancora riscontro da IPPOG

Technically/practically

Should we think this is a viable initiative we need

- all formalities with IPPOG, INFN, EPIC,..
- exercises based on EPIC simulation/reconstruction to be carried on with the students
- framework easy-to-install on classroom desktop computers

Looking for a flexible, high impact, all-ages, international, replicable format to be spent in festivals, events and to be advertised at conferences in outreach sessions

What is an Escape Room?

F. Cavallari
LHCP 2024

- An escape room is a treasure hunt indoor, with clues hidden in a room
- In principle people should be trapped in the room until they find all the clues and manage to open the door within a given time limit
- The clues are chained one after the other
- A facilitator can guide the team and help them to proceed if they are stuck

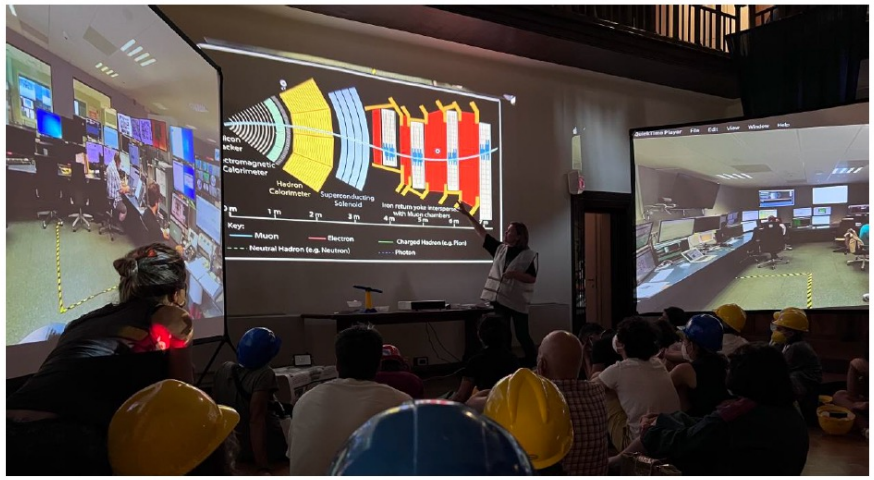
- Escape rooms have become popular among teenagers, as well as a team building exercise

- The **theme** of the room can be historical, scientific or investigative → one can use the theme of the room as a teaching environment
- The solution of a puzzle release the next clue in a dynamic and **rewarding** way → immediate feedback and learning experience

Escape Room in Science Educatio, e.g. here

Escape Room Examples: HEPSCAPE

https://web.infn.it/hepscape/en/



Bologna - ICHEP - 2023

Valle d'Aosta – in a school for La Thuile Conference - 2024

F. Cavallari
LHCP 2024

ERN - Roma - 2021

Adaptable to different locations

Frascati – OpenLabs -2023

Escape Room Examples: Fisica Medica

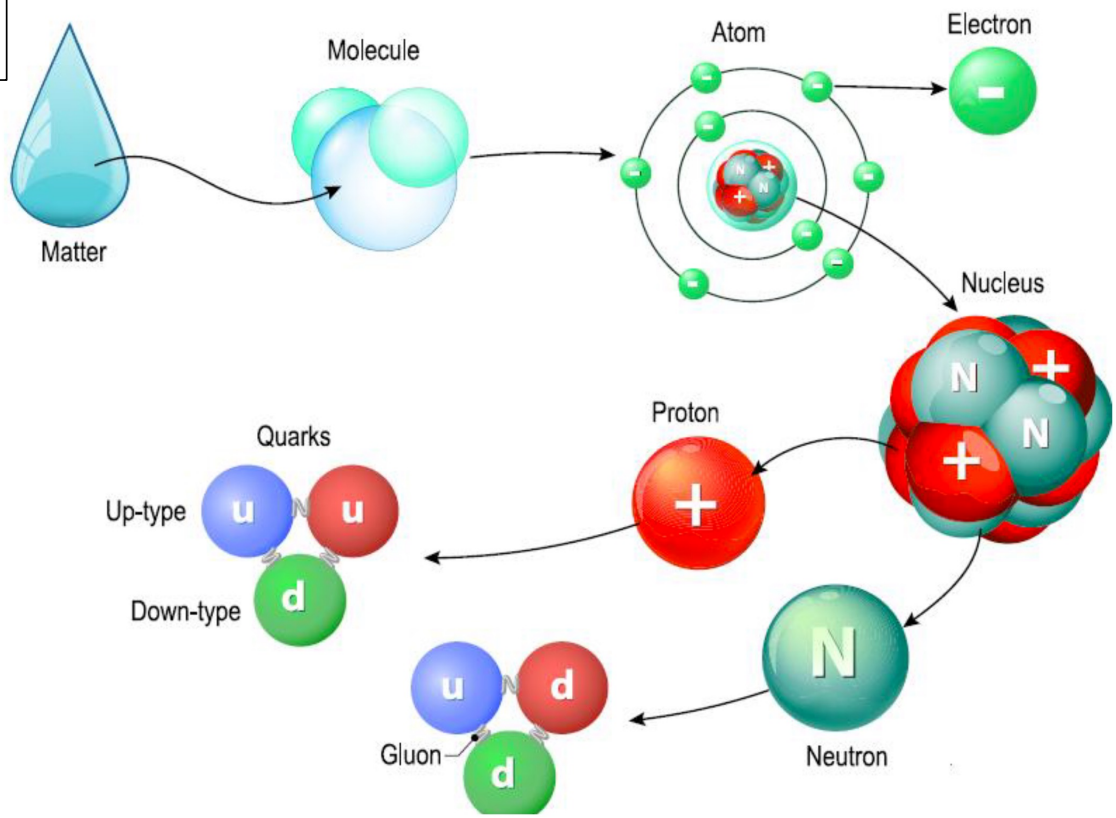
https://fisica61.wordpress.com/

Menzione speciale per la comunicazione scientifica SIF2023

Courtesy A. Vignati

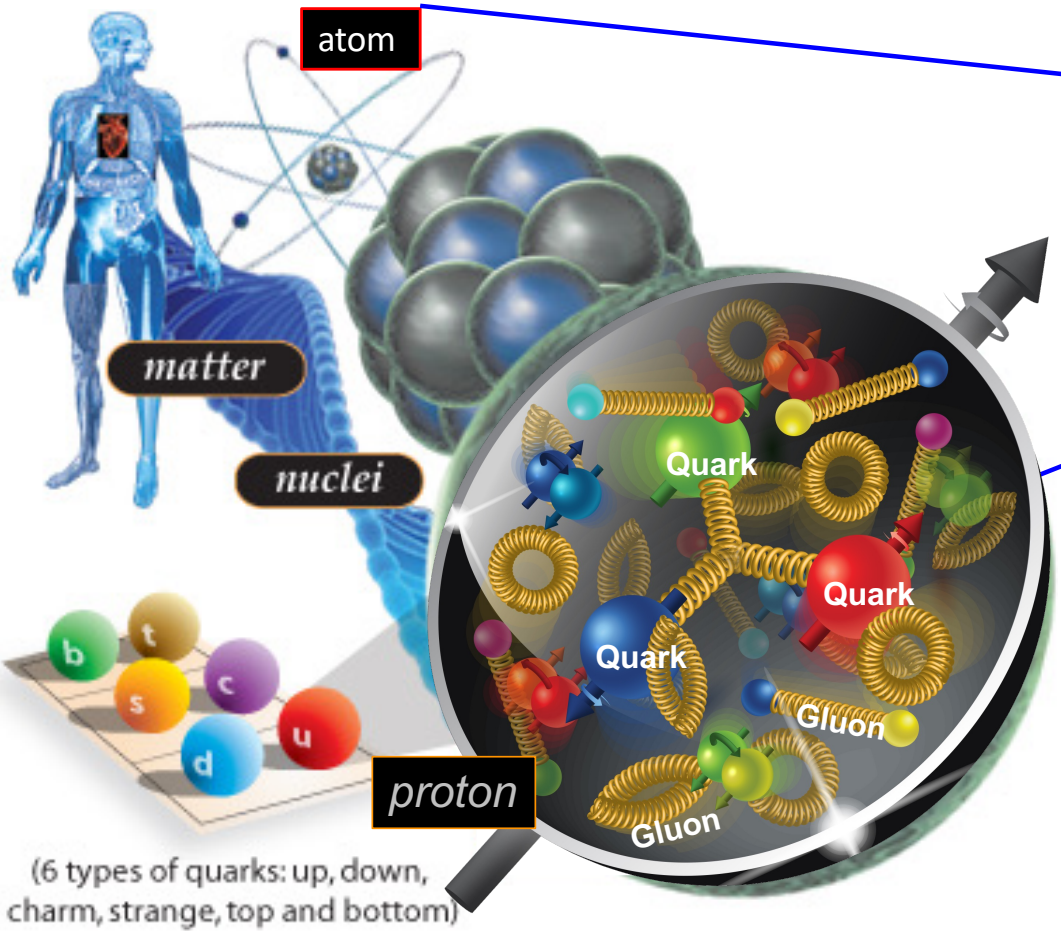
Random thoughts

Atom	10^{-10} m
Nucleus	few x 10^{-15} m
Proton	$<10^{-15}$ m



What is matter made of?

Random thoughts



if you look through a higher and higher resolution microscope you discover a femto Universe

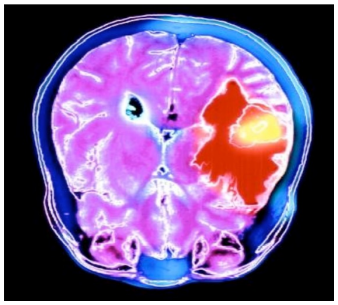
size scale

$3.2\ 10^{-15}$ feet = 1 femto m (fm)

What is matter made of?

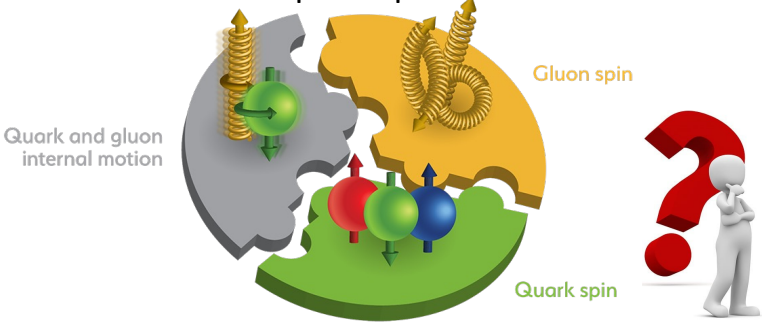
All elementary building blocks can be characterized by their mass, spin and charge

Proton spins are used to image the structure and function of the human body using the technique of *magnetic resonance imaging*



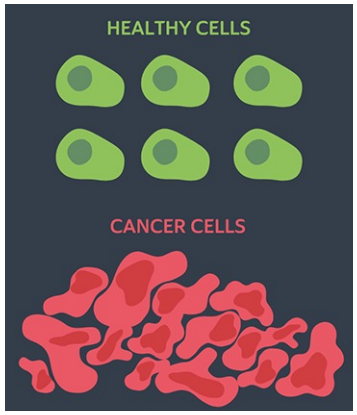
Nobel Prize 2003:
Paul C. Lauterbur & Sir Peter Mansfield
for discovery concerning magnetic resonance imaging

What makes up the spin of the Proton?

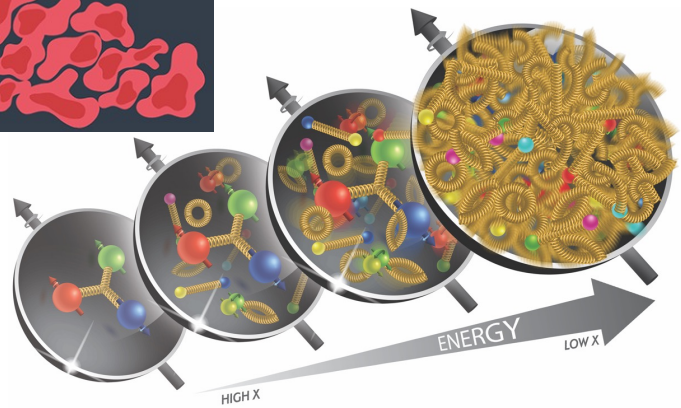


Proton spin

Random thoughts



Are gluons in the proton like cancer cells in an organism ?
Their number is growing – growing - growing



EIC
will tell us the growth gets tamed
and if gluons saturate into a new state of matter
The Color Glass Condensate

Gluon saturation

Festivals, NdR (reseach night), link to CC3M outreach sessions in conferences

We could/should design and develop one activity proposed as a (educational) game for all ages. Made of pieces and videos

Build the pieces with the help of our Mechanical Workshops

Realize various copies of the same activity and/or make it easily portable such that all EPIC members can use and propose it

Man power and money are needed! Need a working group for this project – make it a contest for university student? Awarded projects are funded

N.B.: «The way to get out is to find a rigorous proof of confinement within QCD» by Marco Radici

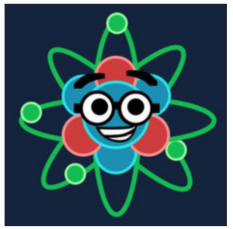
Existing tools

Videogames!

Back

Quantum 3

https://gamedev.msu.edu/quantum3/



TEAM

Huey-Wen Lin – Principal Investigator

Brian Winn – Executive Producer

William Jeffery – Producer

Tristan Özkan – Game Designer and Programmer

Harrison Sanders – Game Designer and Programmer

Rebecca Roman – Sound Designer

Roman Firestone – Artist

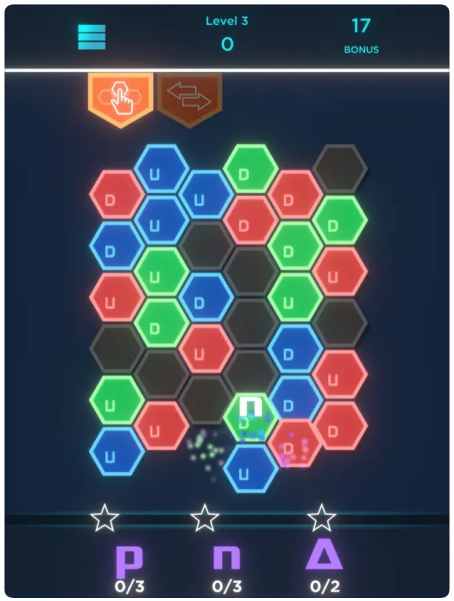
Colleen Little – Artist

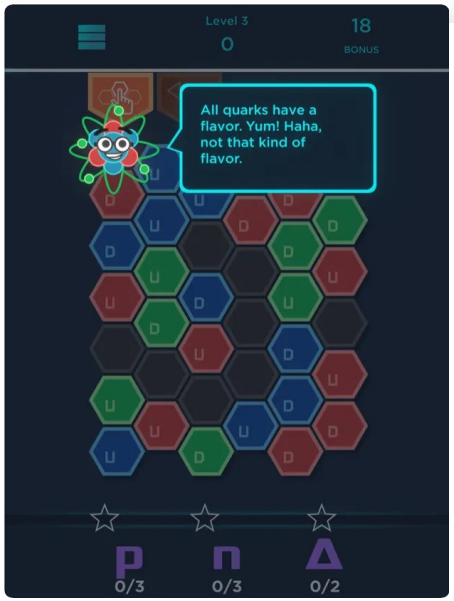
Release Date: January 2019

Quantum 3 is an educational match-3 game for all ages where fun meets quantum physics!

Build subatomic particles, learn about the mysteries of fundamental physics and deploy antimatter to clear the way! You'll match and swap quarks to make (and learn about) the baryons you need for each objective. Puzzle out the quantum properties of color, flavor and spin. So get in there and start your quantum-venture! Quantum 3 is puzzle-matching at its finest and a great intro to the world of particle physics!

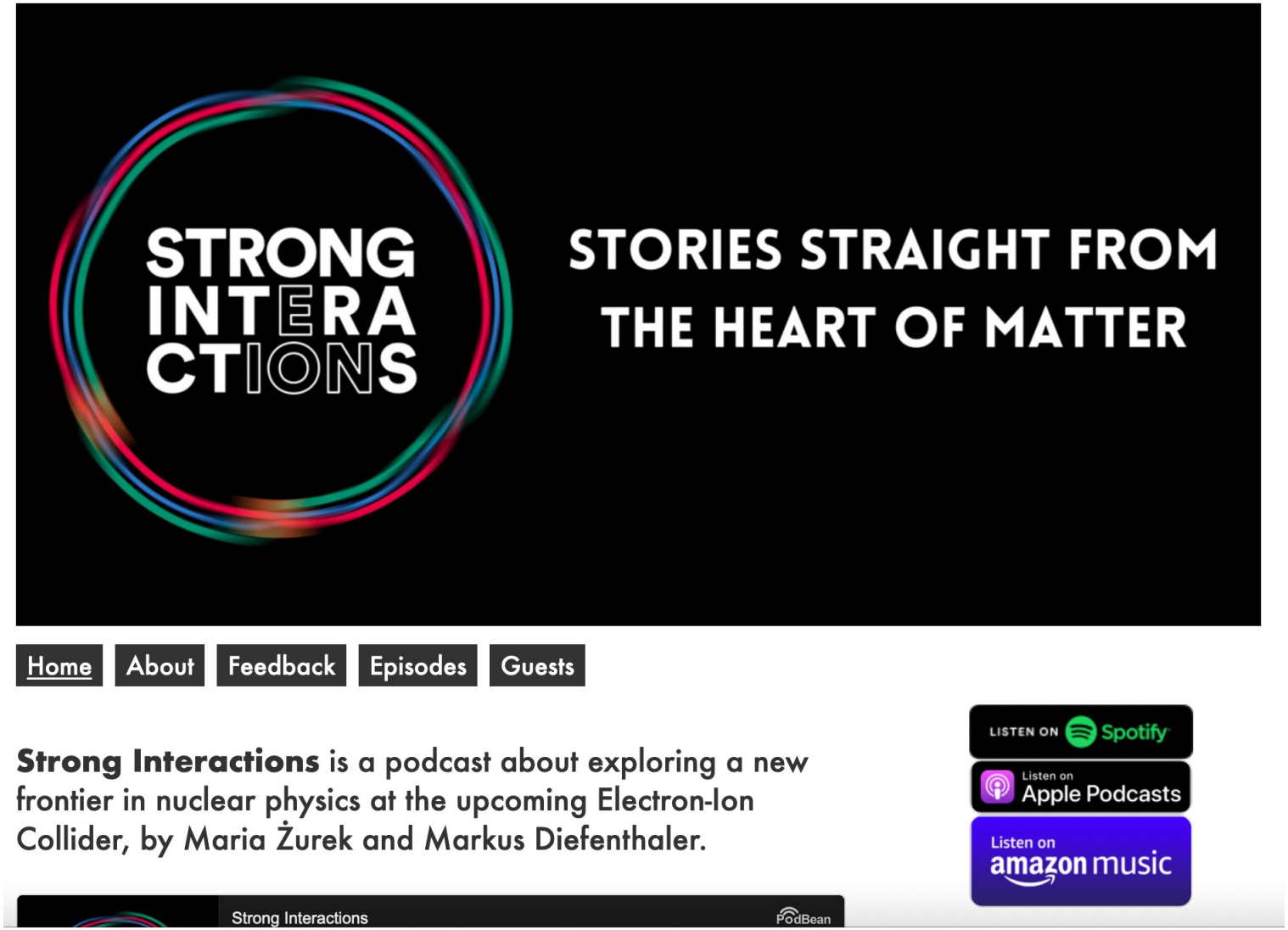
SCREENSHOTS





Marco Radici and Pavia group for the Italian translation

Podcasting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Other kind of contests for univ students

- **Photo**
- **Projects**
- **Videos**
- **Podcasts**

- **Slam/pitch**

Informal speach, short (3-5 minutes), clear, scientific sound but at the same time understandable to non-experts

Social media and gadgets

- **Website**
- **IG, FB**

Man power and money are needed!

Should we establish a working group on outreach?