Belle II detector in Virtual Reality

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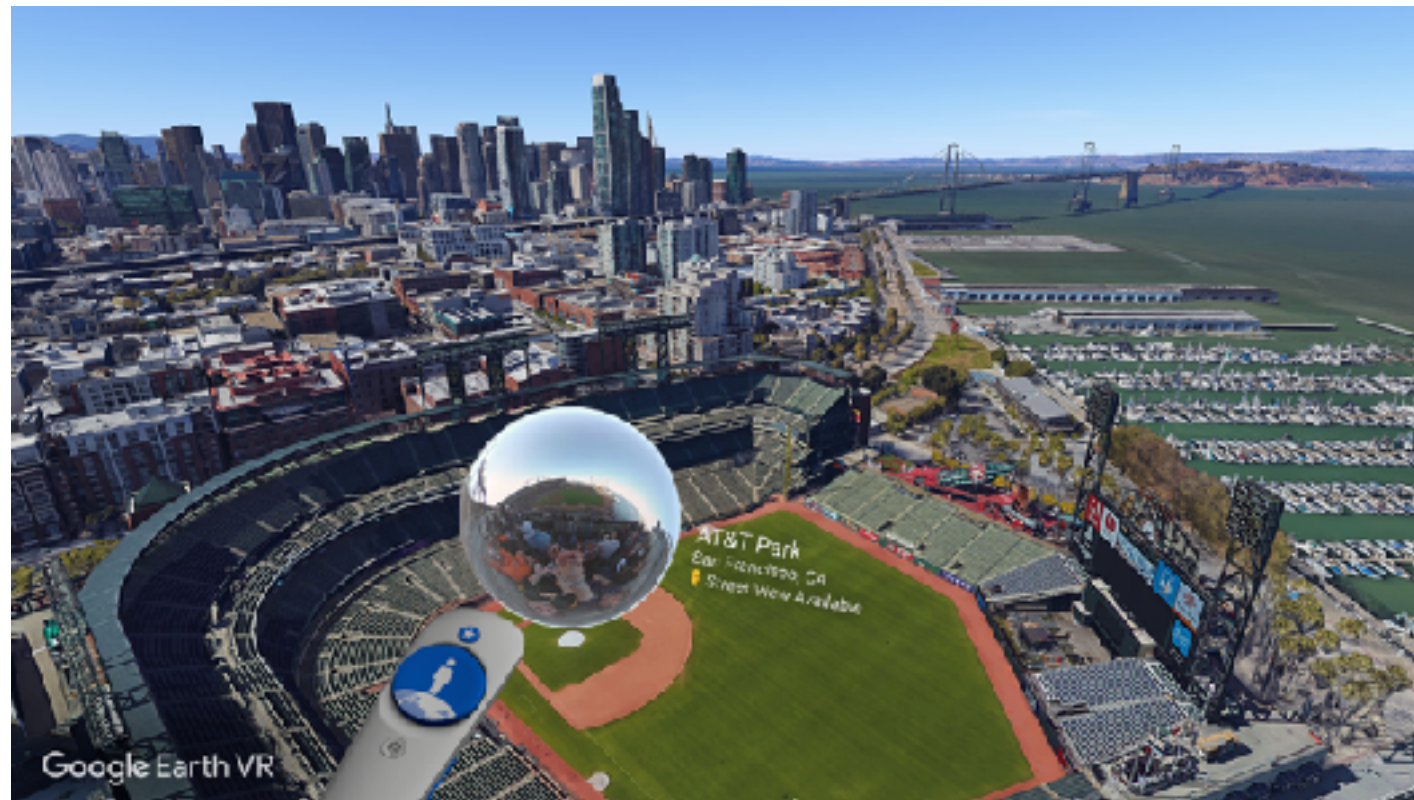**8th BelleII Italian meeting**
Pisa, November 2017

OUTLINE

- How Virtual Reality works

- Belle II: hardware and software needed

- Results and possible applications

How Virtual Reality works

Virtual reality (VR) uses sensors (called stations) in order to record the environment and *generate realistic images and sounds* inside a simulated virtual space.

A VR system also provides the possibility to *interact* with the virtual world.

VR systems can transmit vibrations to the users through game controllers or other devices in order to reproduce different *sensations*.
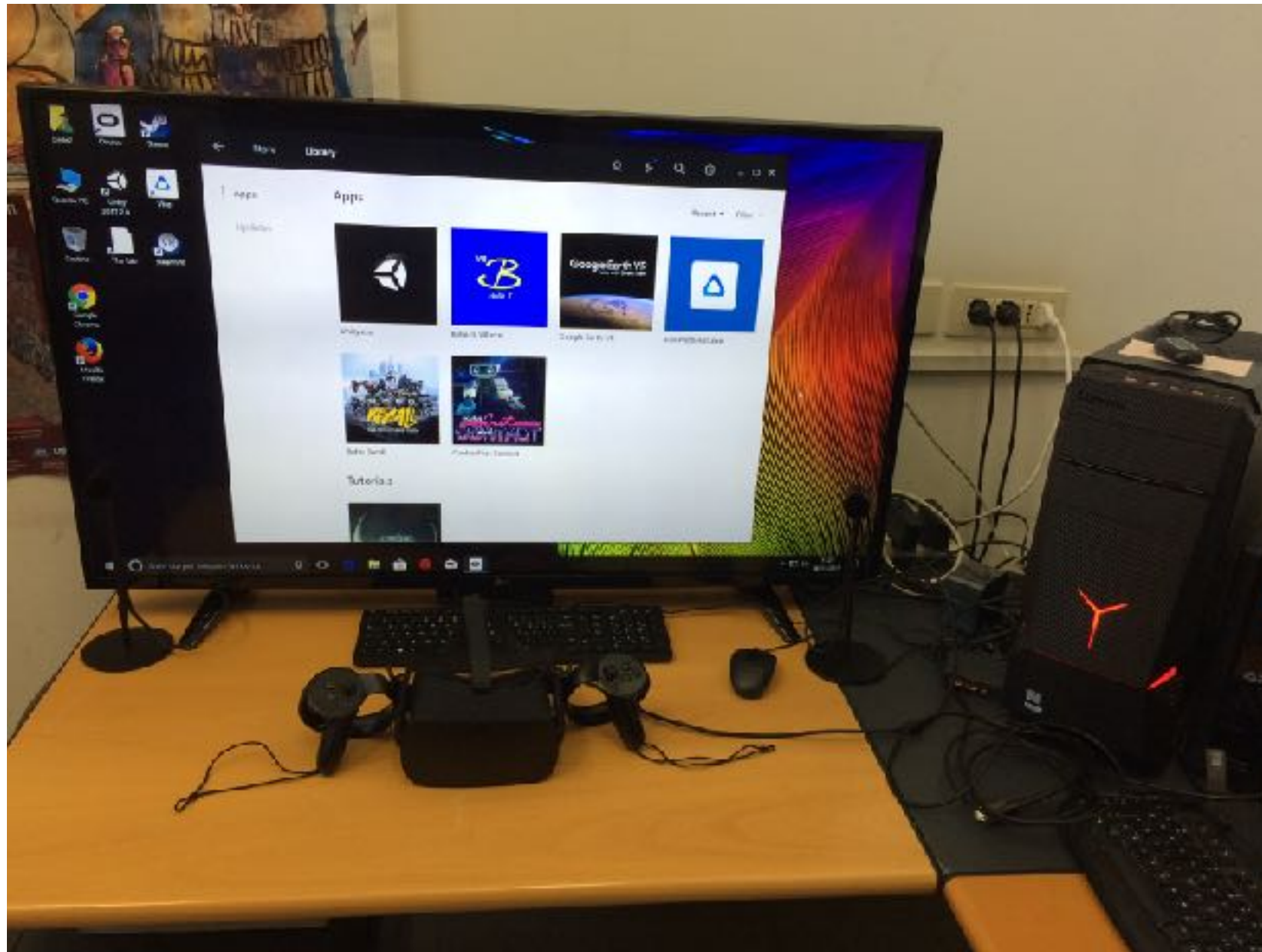
Belle II: hardware and software needed (I)

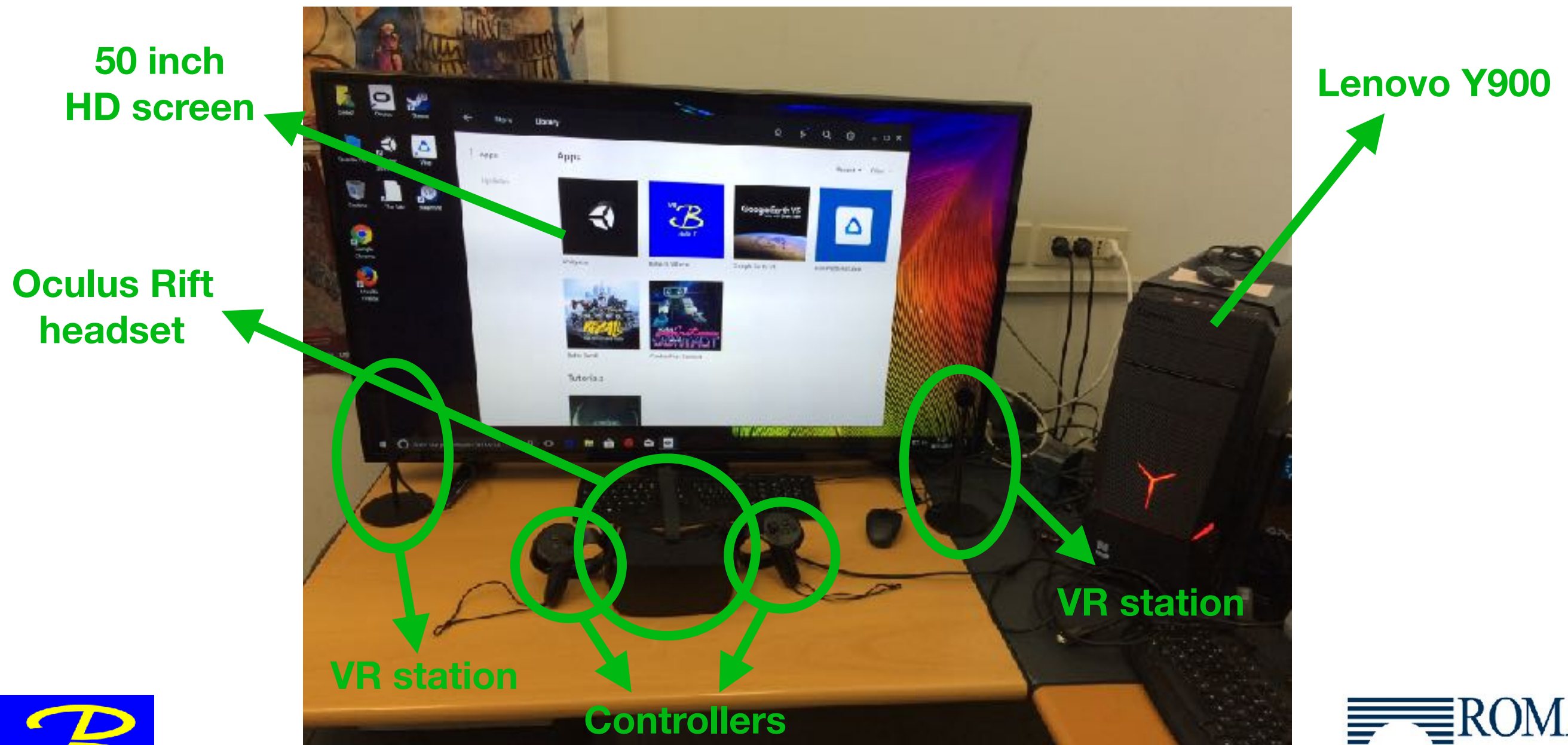1. **Oculus rift headset:** it needs at least 4 m^2 of space to *optimize* movements

Belle II: hardware and software needed (II)

1. **Oculus rift headset:** Roma Tre ***temporary*** setup
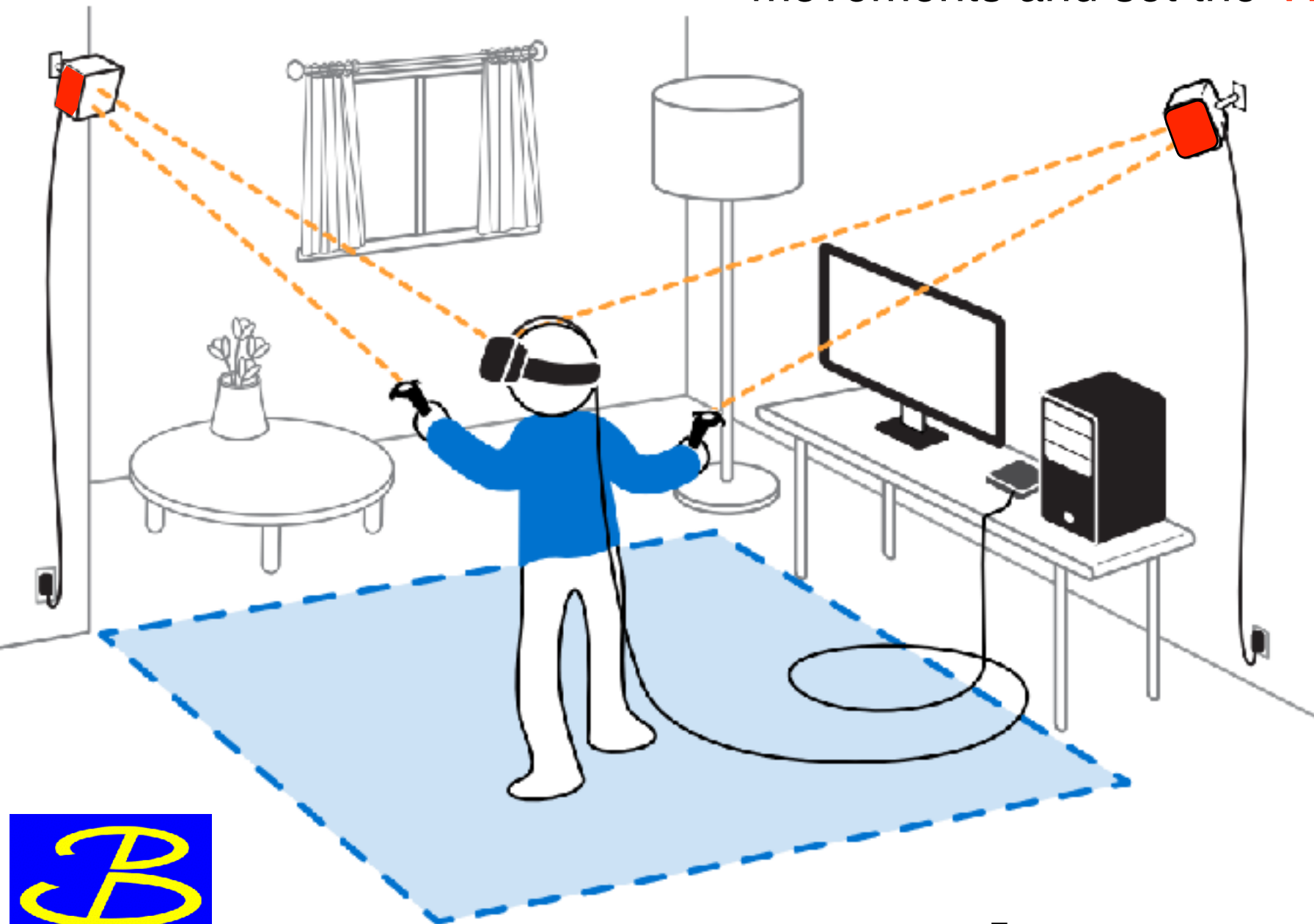
Belle II: hardware and software needed (II)

1. **Oculus rift headset:** Roma Tre ***temporary*** setup

50 inch HD screen

Lenovo Y900

Oculus Rift headset

VR station

VR station

Controllers

Belle II: hardware and software needed (III)

2. **HTC Vive headset:** it needs at least 10 m^2 of space to *optimize* movements and set the VR stations

Belle II: hardware and software needed (IV)

2. **HTC Vive headset:** Roma Tre ***temporary*** setup

50 inch HD screen

Lenovo Y900

HTC Vive headset

Controllers

VR station

As first approach I personally suggest the Oculus rift headset

• Easy to setup
• Needs no much space to work properly

But……..

HTC Vive is better!!

Belle II

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Belle II: hardware and software needed (V)

● 🖝 **alternative**

Hardware requirements and Roma Tre expense:

Computer requirements:

- 8 Gb dedicated graphics
- 3 USB ports + 2 HDMI ports (1 dedicated to the HD screen)

Extra:

- Xbox controller: it is not configured (<u>yet</u>) to work with the HTC Vive
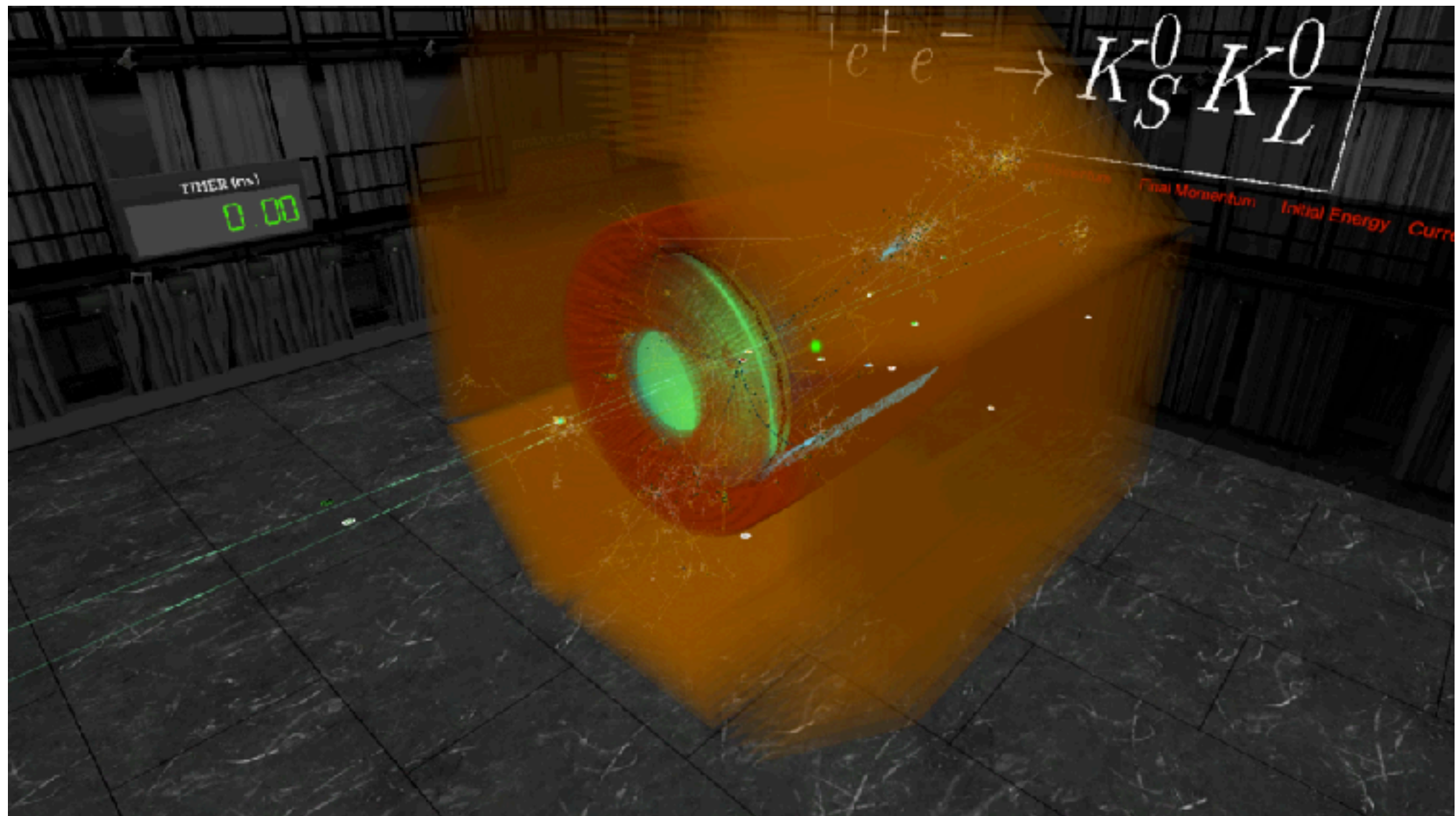- Big HD screen

Belle II software is free (http://www.phys.vt.edu/~piilonen/VR/)

VR setup with Oculus rift costs in total ~3000 €

Belle II

details…
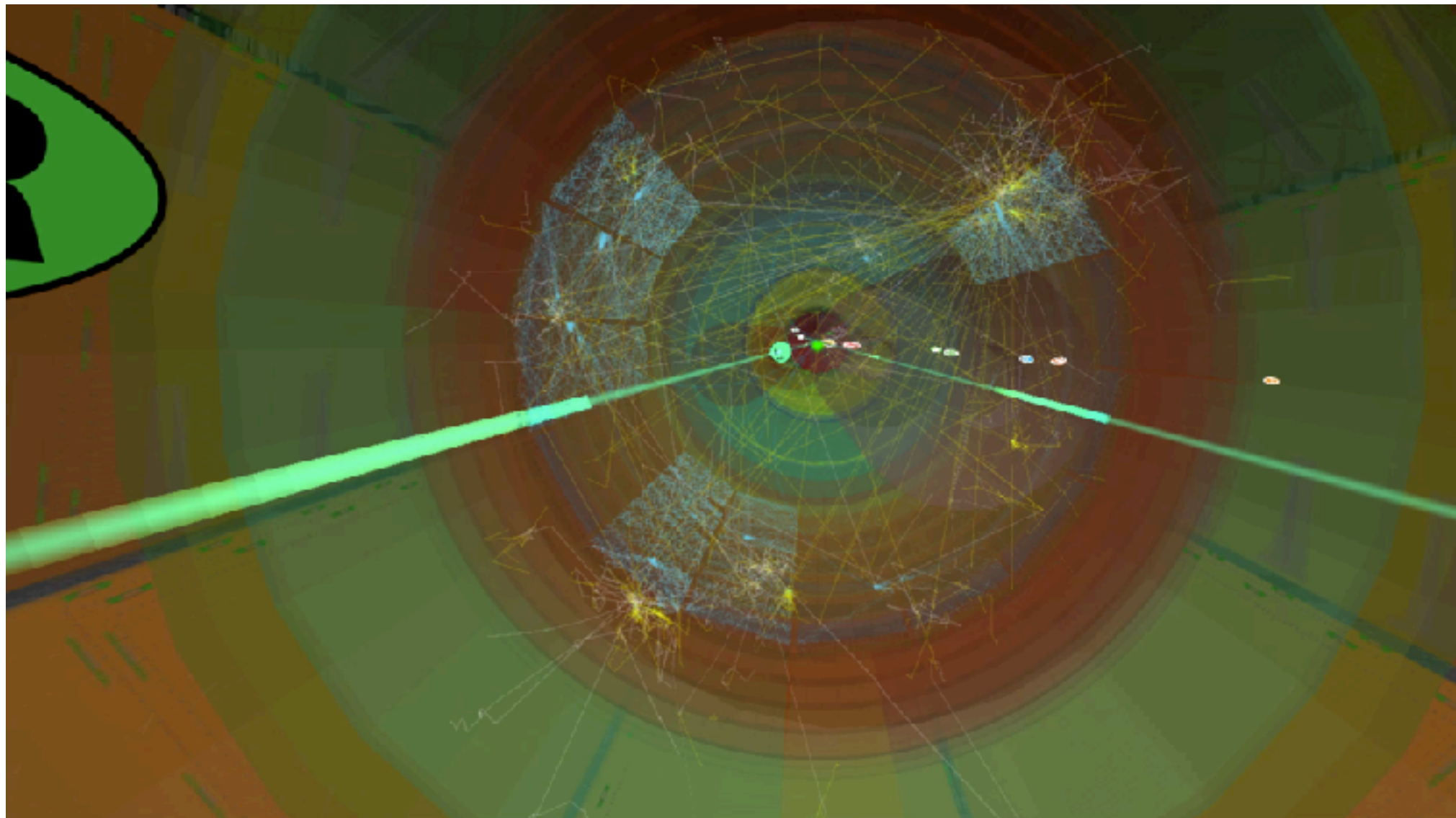
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Results and possible applications (I)

Example video of BelleII detector in VR made by Roma Tre group

Results and possible applications (II)

Example video of BelleII detector in VR made by Roma Tre group

Results and possible applications (III)

Other **HUGE** results obtained by Roma Tre group

A. Budano holds the record as meteorites destroyer!

Record

Space ship

Meteorite

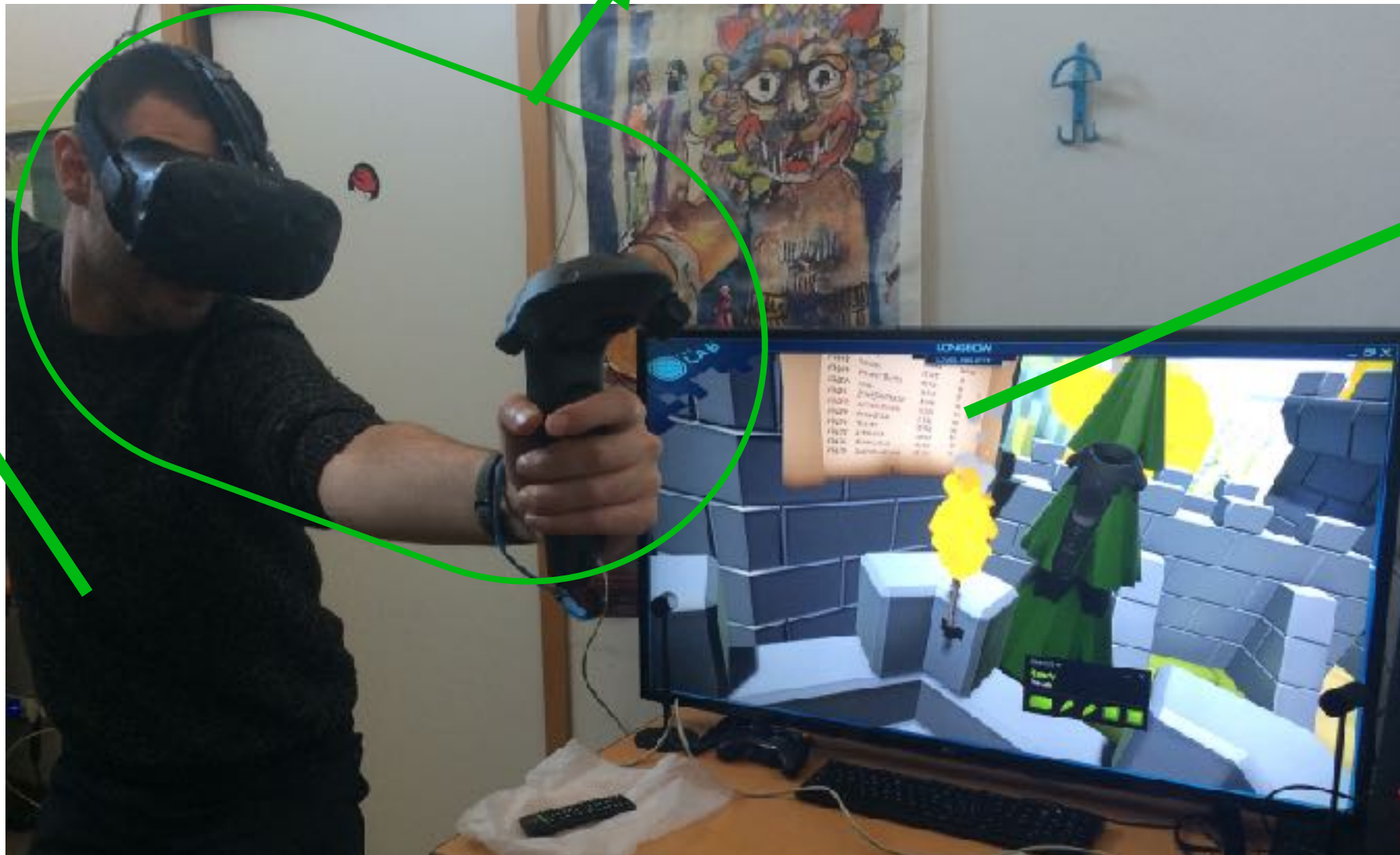**Meteorites destroyer**

Belle II

Results and possible applications (IV)

Other **HUGE** results obtained by Roma Tre group

**I hold the record as ruthless archer!**

Fight position

Ruthless archer

Record score

Results and possible applications (V)

VR allows to look at the whole Belle II detector and see what happened inside it:

- Didactic advantages at different levels (physics students and not);

- Faster and better understanding of phenomenon;

- Validation of Monte Carlo;

- Cool tool used to make people interested in physics.
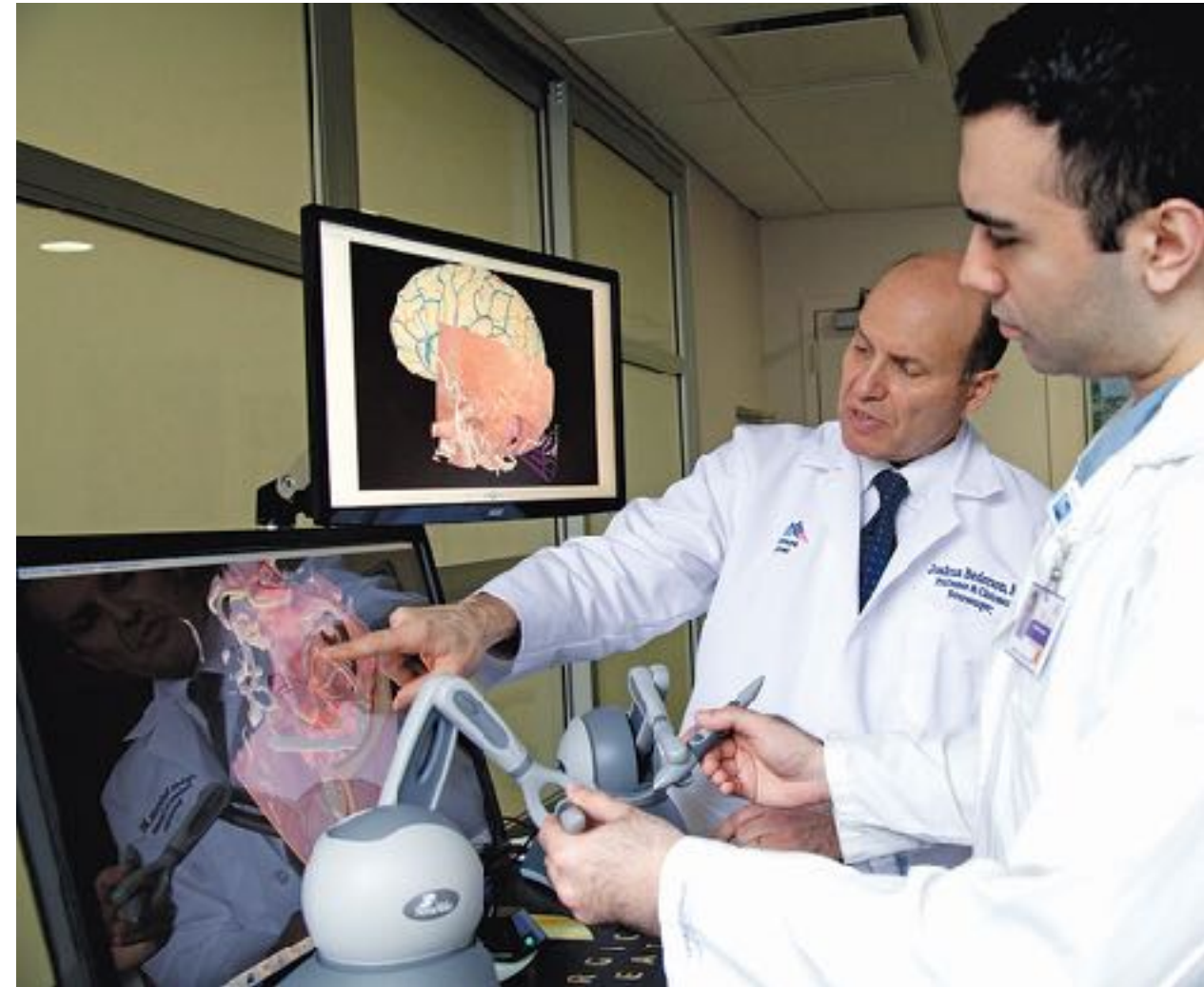
Virtual Reality could be really helpful for example for surgical training (it has already done), medical developments, constructions, business (selling properties), sport training ecc..

Belle II

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Roma Tre VR Group

If you are interested and/or you need more informations contact us:

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- <u>alberto.martini@roma3.infn.it</u> (Alberto Martini)

BACKUP SLIDES

Belle II: hardware and software needed

Roma Tre hardware expense:

Computer:

- ASUS ROG Strix - used by Virginia Tech
- Gigabyte P57Wv7-KL3 - suggested as alternative by Virginia Tech
- Lenovo Y900 - used by Roma Tre group

Total:

~3500 €

VR headset:

- ✳ Oculus rift - used by Virgnia Tech and Roma Tre group
- ✳ HTC Vive - used by LMU and Roma Tre group

Extra:

- ✦ Xbox controller - *optional*
- ✦ Big HD screen - *optional*

Belle II software is free (http://www.phys.vt.edu/~piilonen/VR/)

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back to presentation…

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