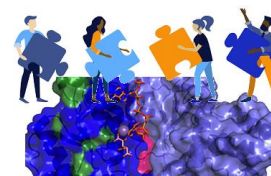
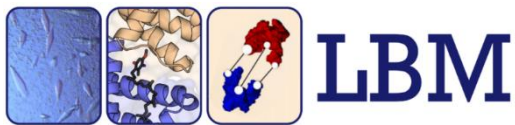
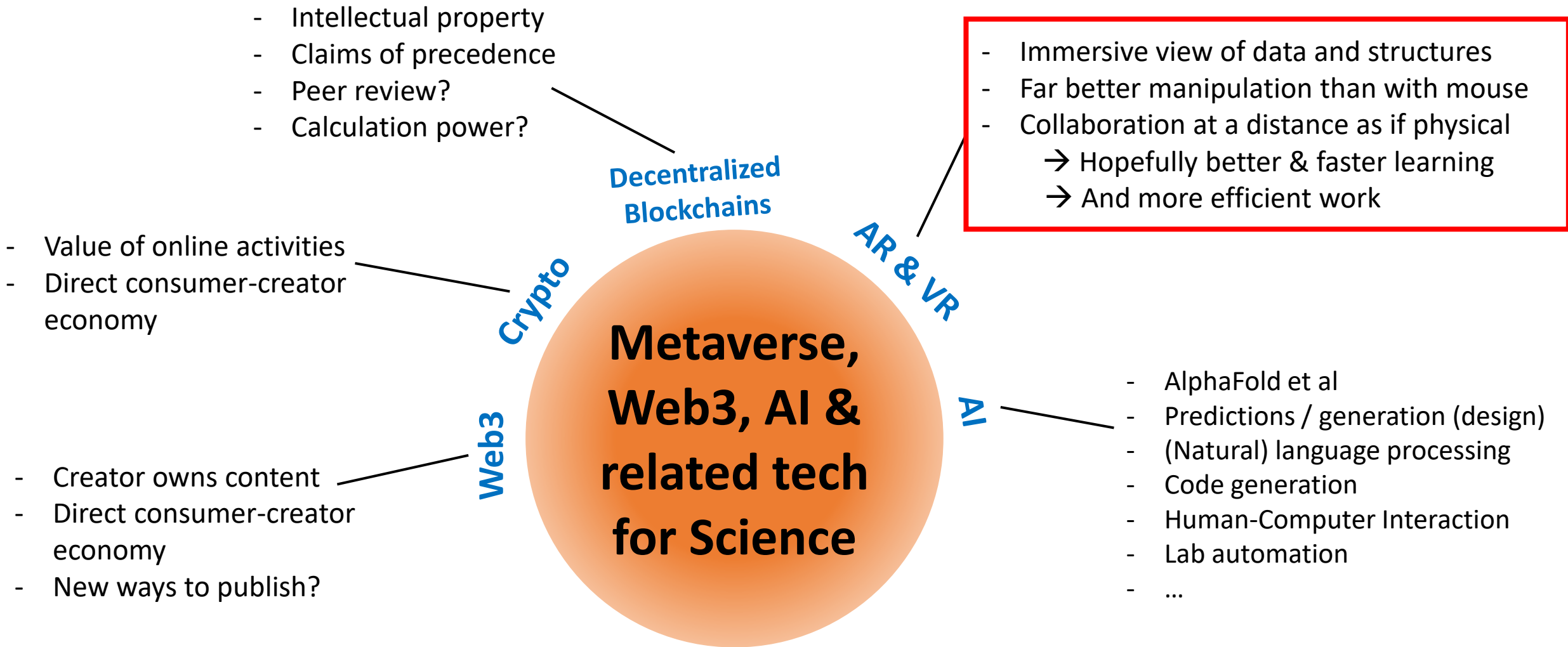


***Work and education involving molecules  
made easier with modern human-computer interactions***

***All web-based***

*Luciano Abriata  
and Fabio Cortés Rodríguez  
Dal Peraro lab*



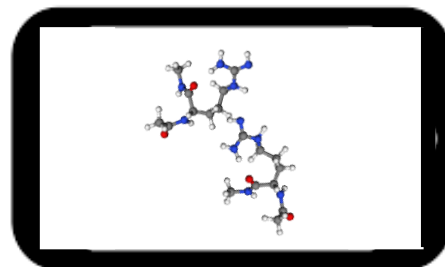
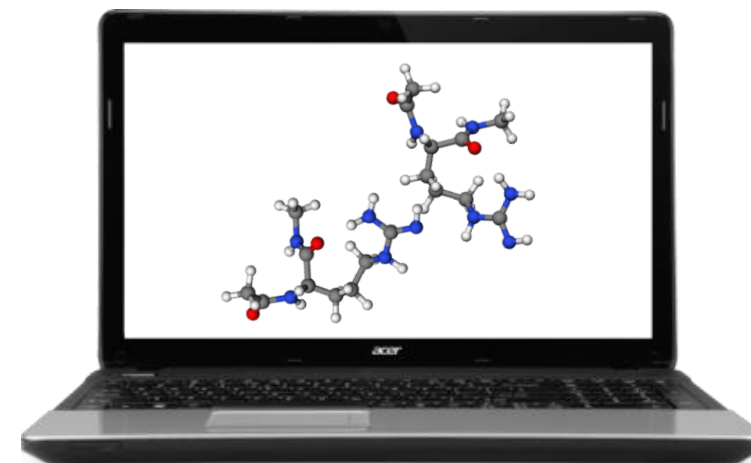
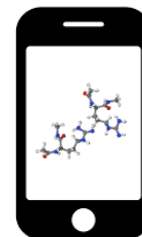


*“An upcoming iteration of the internet as an immersive virtual/mixed reality world with smooth human-computer and WWW-mediated human-human interactions + tech based on cryptography/blockchain technologies that are supposed to positively transform work, entertainment, education, economy, culture, politics...”*

# WE MAKE ALL OUR TOOLS FOR THE WEB



- \* Instant content
- \* No downloads, setups, etc.
- \* Easy deployment
- \* High standardization
- \* Cross-device & Cross-OS
- \* Easy to code & interface

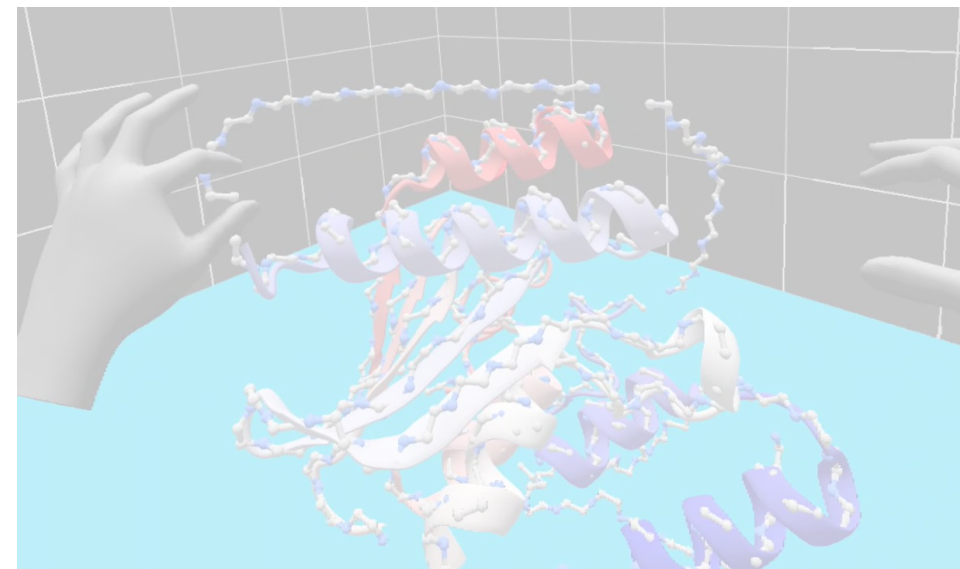




# MolecularWebXR

*Out since mid October 2023*

## HandMol



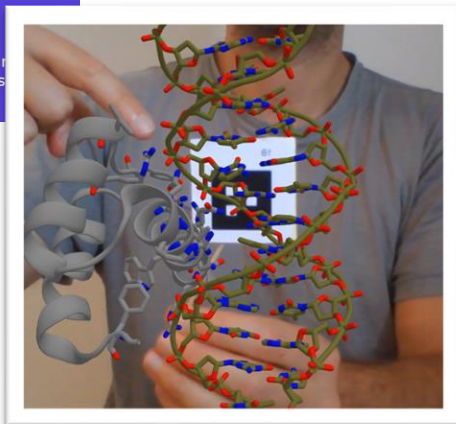
*Working prototype out in 2 weeks*



## MolecularARweb

A website for chemistry and biology education through augmented reality, available out of the box in commodity devices

*Rolling since 2020*

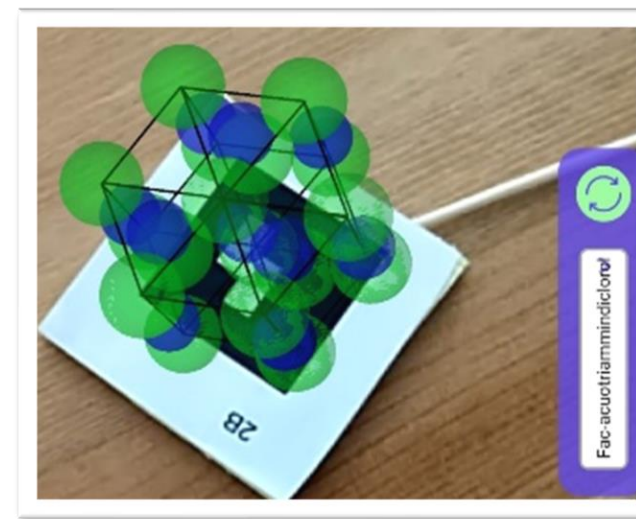
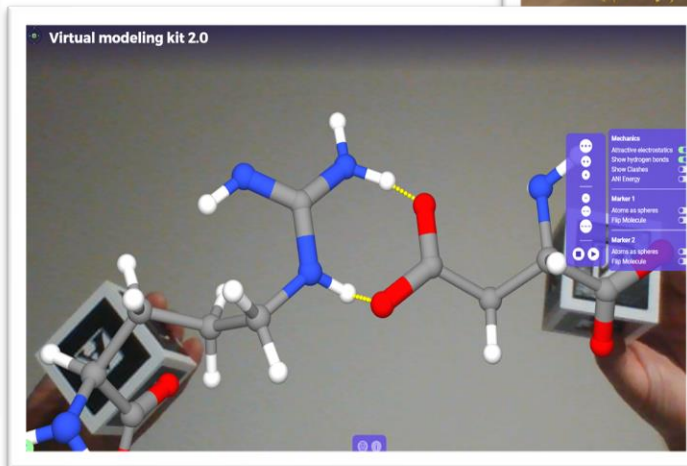
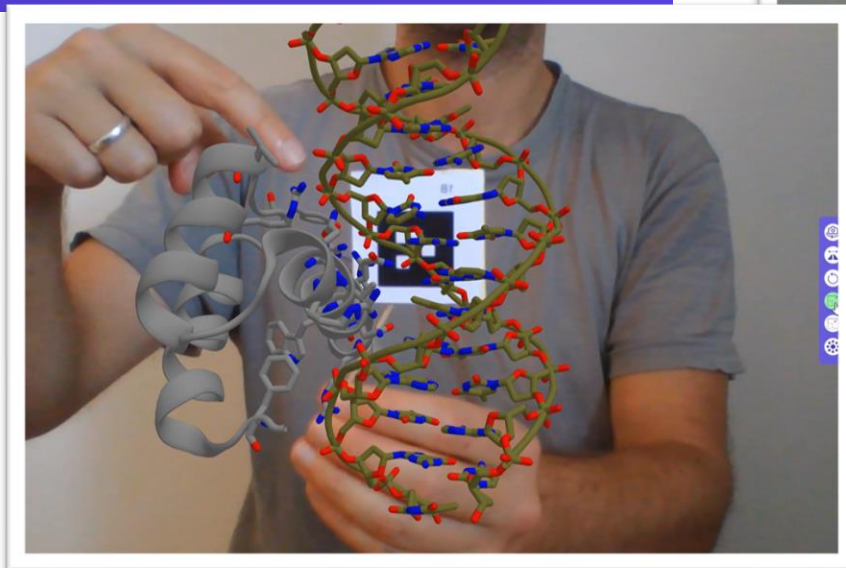
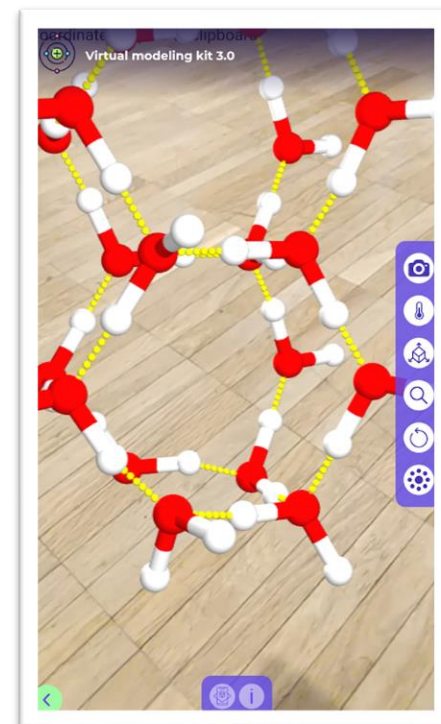
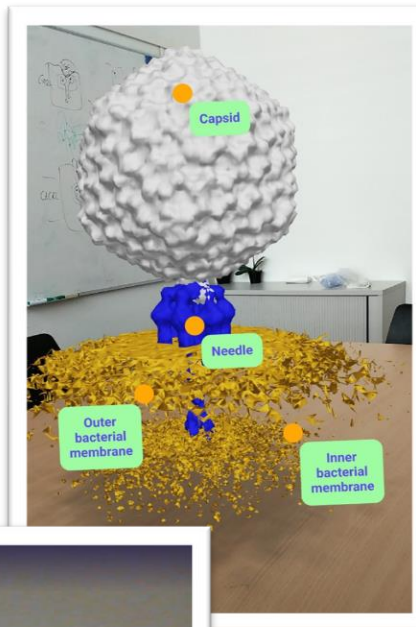
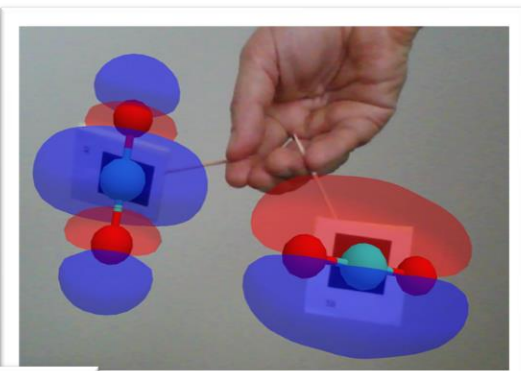






# MolecularARweb

A website for chemistry and biology education through augmented reality, available out of the box in commodity devices

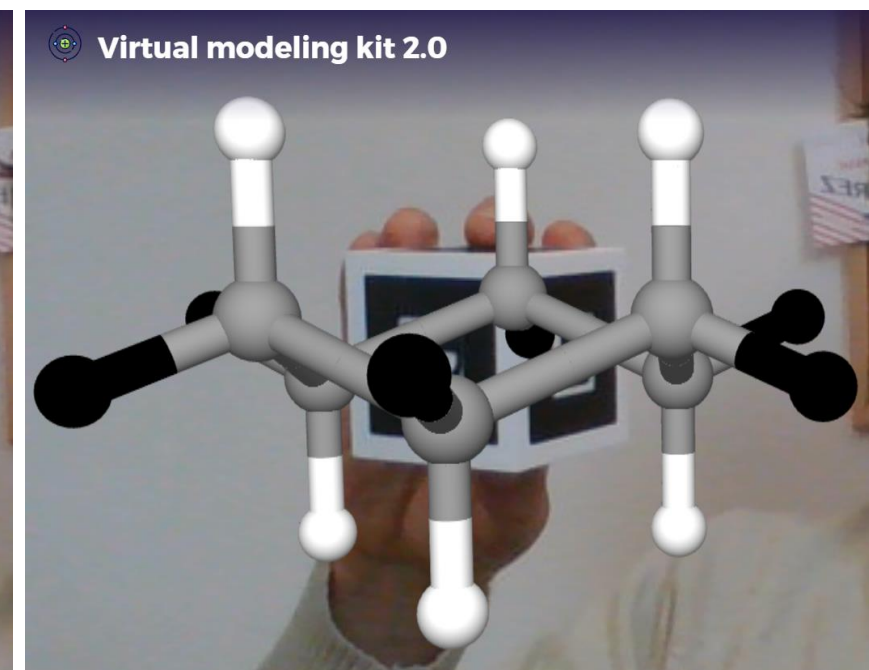
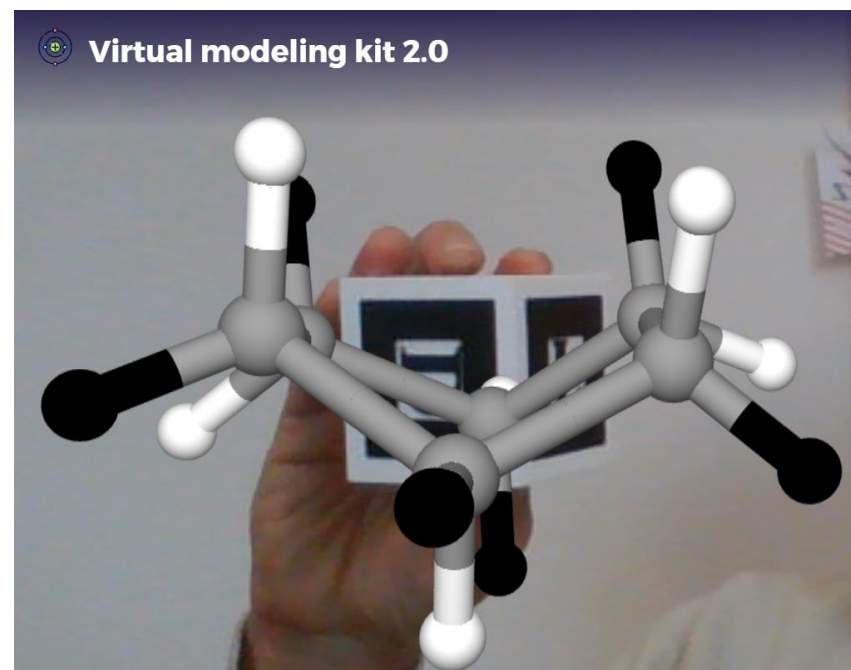
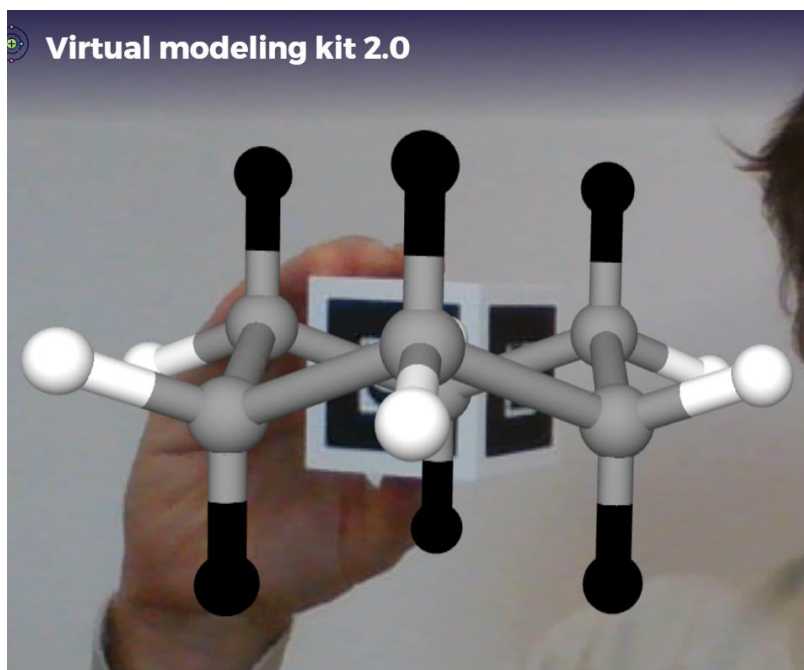
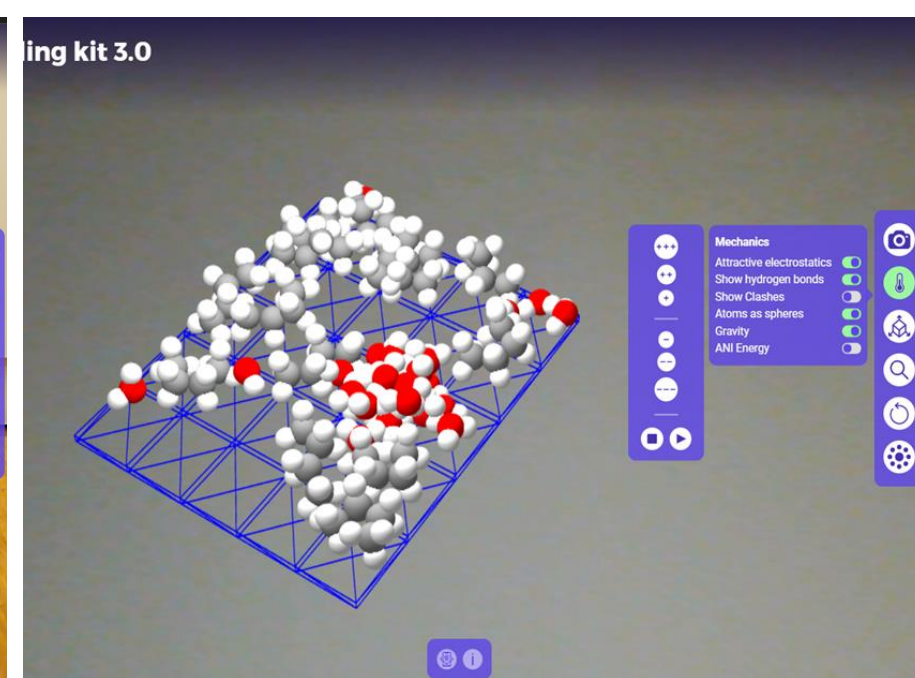
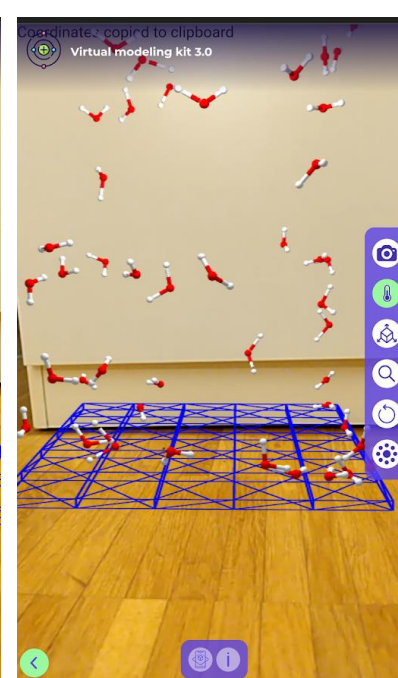
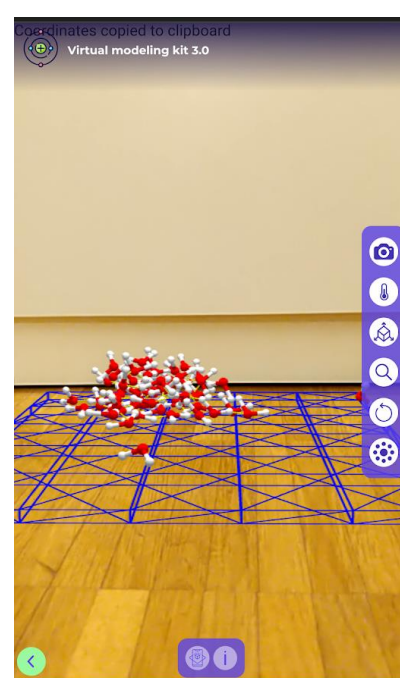
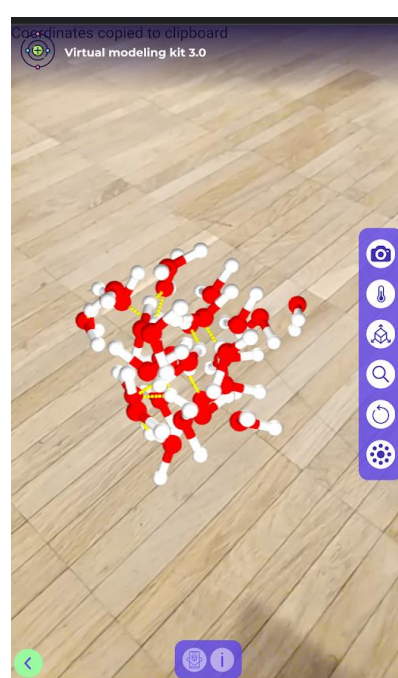
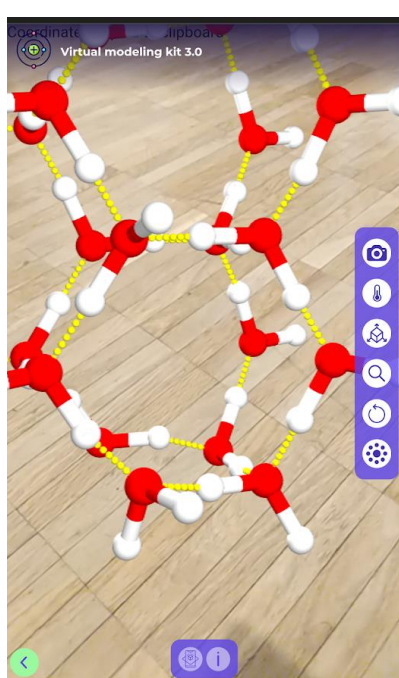


JOURNAL OF  
**CHEMICAL EDUCATION**

## MolecularARweb: A Web Site for Chemistry and Structural Biology Education through Interactive Augmented Reality out of the Box in Commodity Devices

Fabio Cortés Rodríguez, Gianfranco Frattini, Lucien F. Krapp, Hassan Martinez-Hung, Diego M. Moreno, Mariana Roldán, Jorge Salomón, Lee Stemkoski, Sylvain Traeger, Matteo Dal Peraro, and Luciano A. Abriata\*



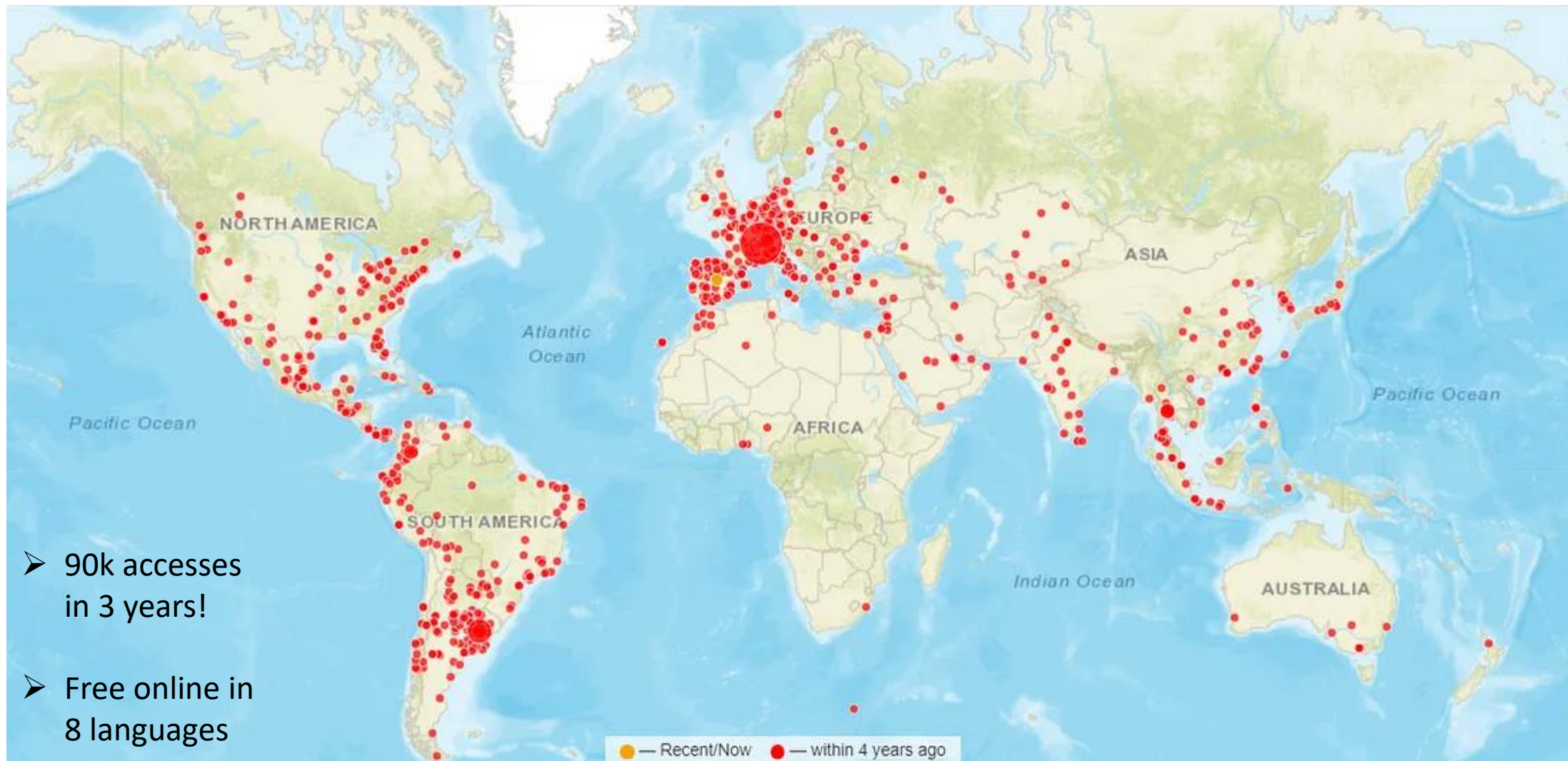






MolecularARweb

<https://molecularweb.epfl.ch>

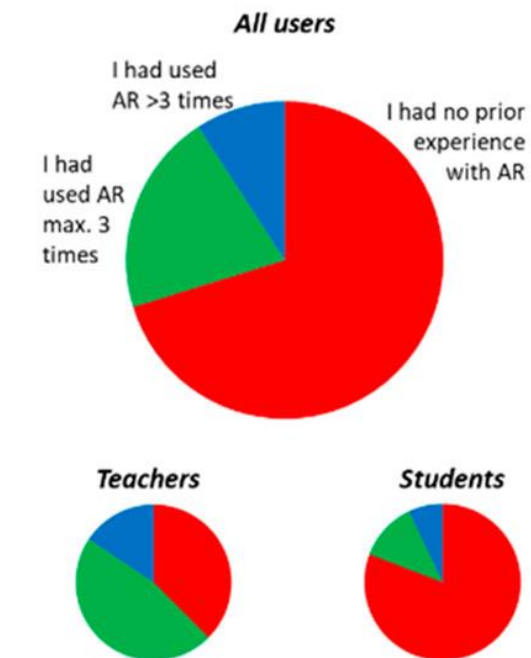


<https://go.epfl.ch/luciano>

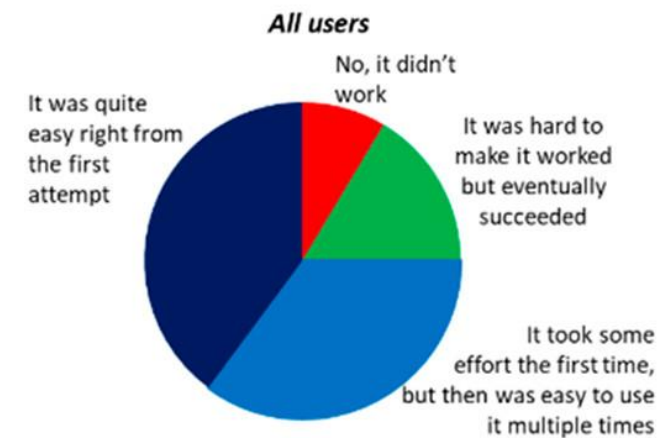
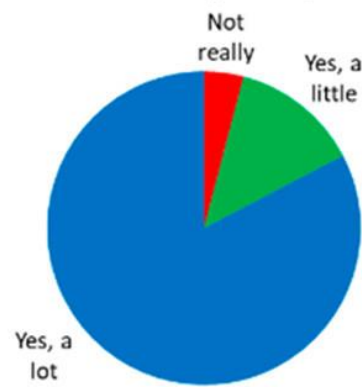
**A****Data from online surveys**

To all users: I had used other AR applications before using this website

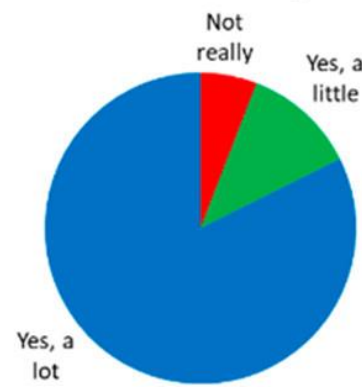
To all users: I could easily use this website to view molecules on the markers



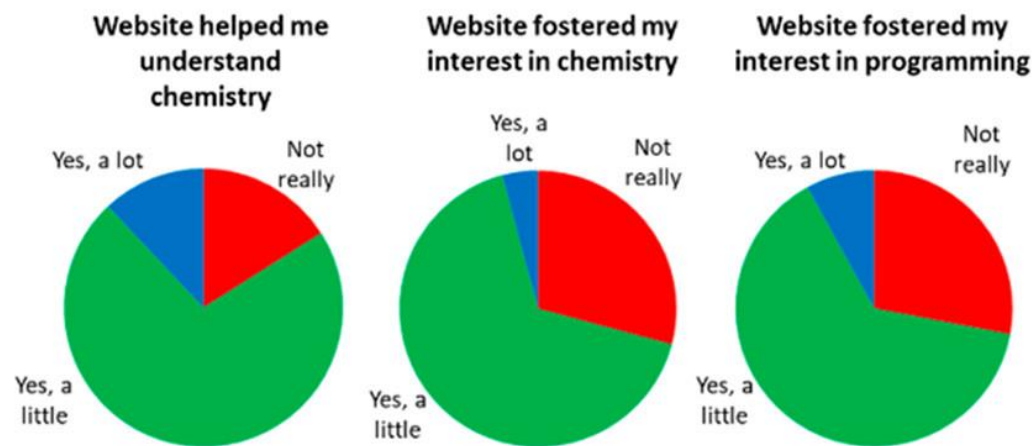
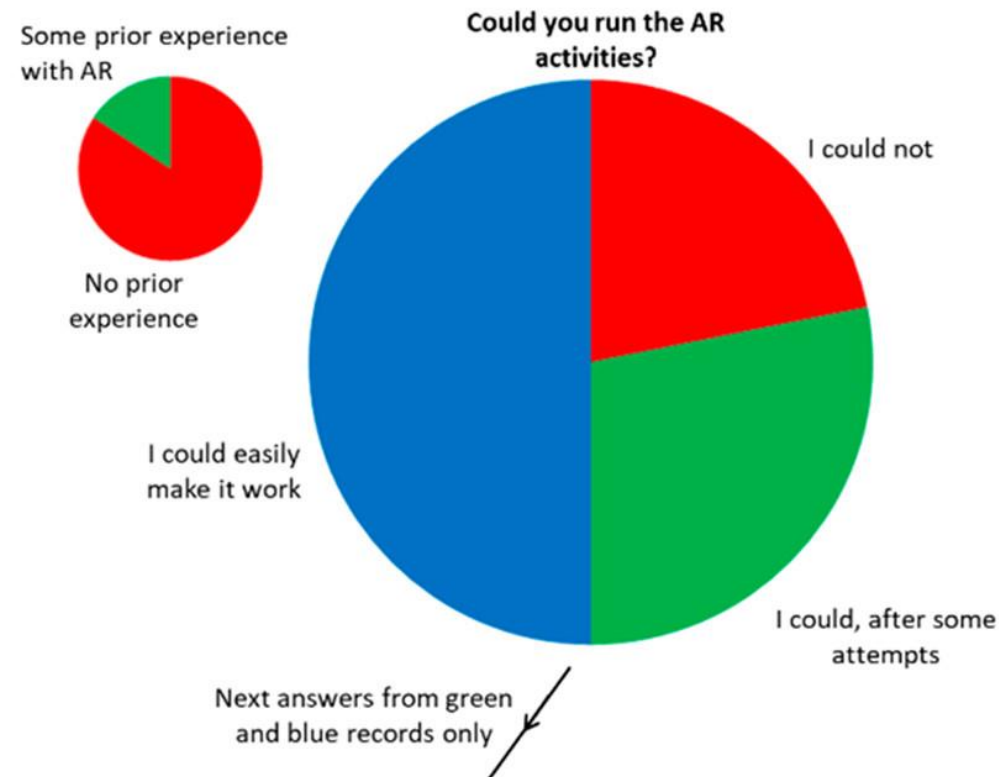
To students: Using augmented reality helped me to better understand the structures of molecules and chemistry concepts



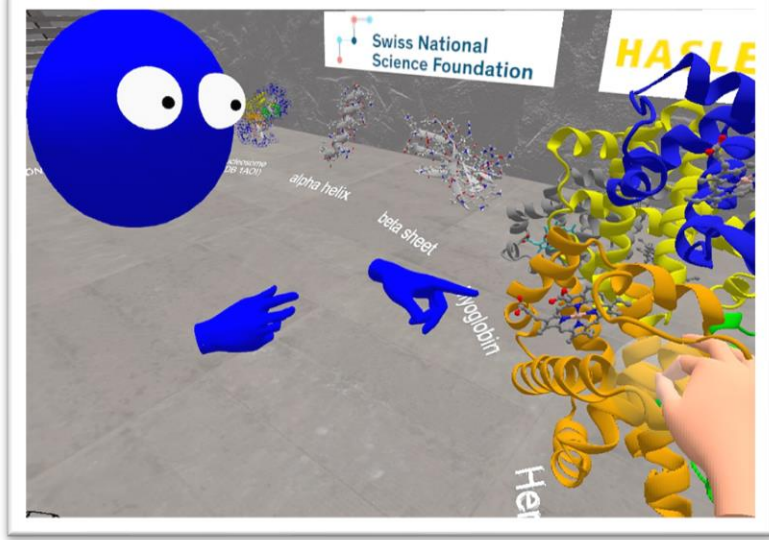
To teachers: I perceived that using the tool helped the students to better understand molecular structure and other chemistry concepts

**B**

Survey to 34 students of a high-school chemistry class in the economics/social sciences branch, working at their homes during the Covid19 pandemic



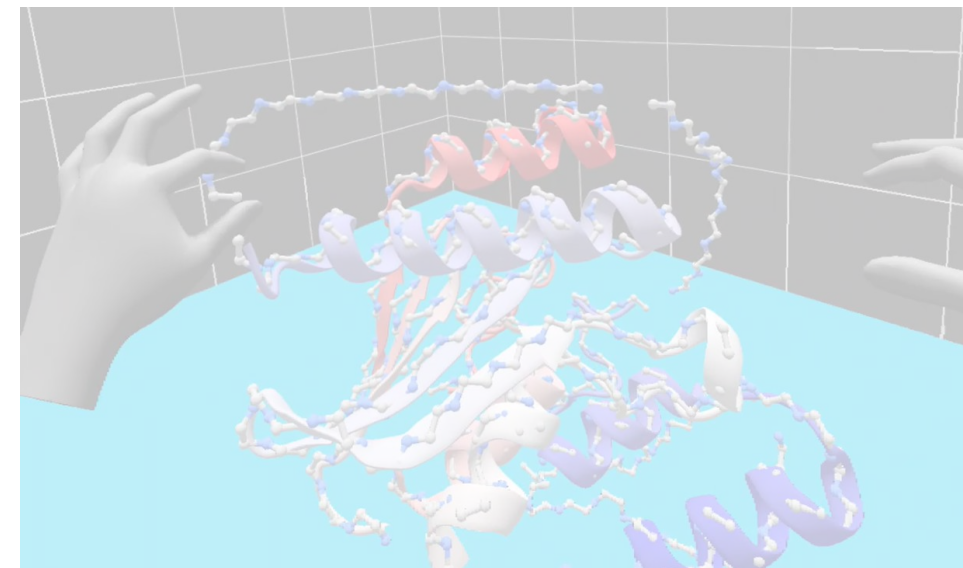




# MolecularWebXR

*Out since mid October 2023*

## HandMol



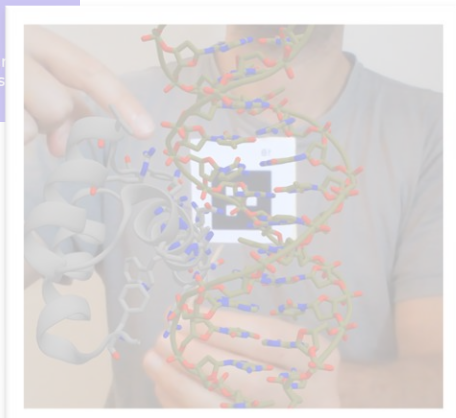
*Working prototype out in 2 weeks*



## MolecularARweb

A website for chemistry and biology education through augmented reality, available out of the box in commodity devices

*Rolling since 2020*



# WE MAKE ALL OUR TOOLS FOR THE WEB



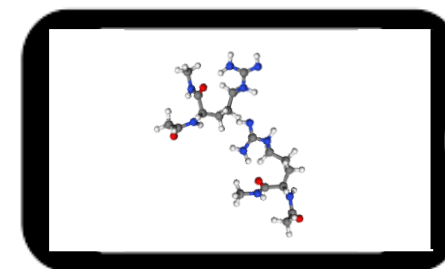
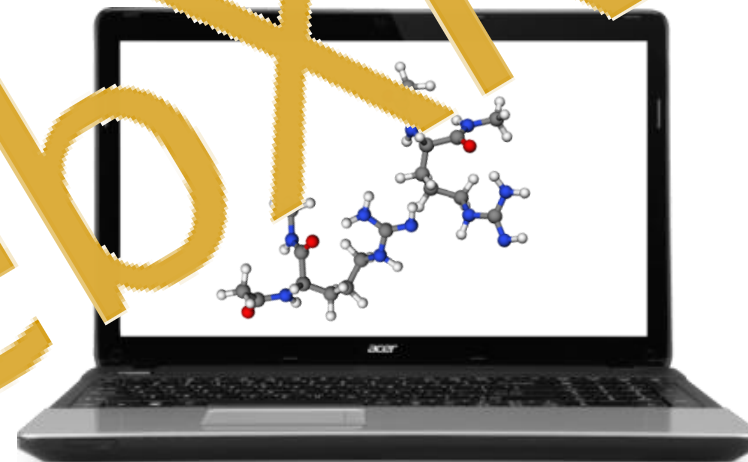
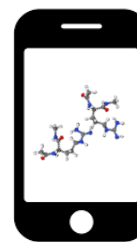
- \* Instant content
- \* No downloads, setups, etc.
- \* Easy deployment
- \* High standardization
- \* Cross-device & Cross OS
- \* Easy to code & integrate

- There's a browser inside
- It is deeply immersive
- And it tracks your hands!



Oculus Quest 2: Today at CHF 350

<https://go.epfl.ch/luciano>

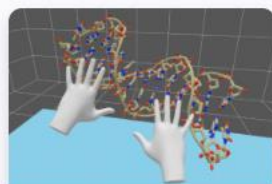




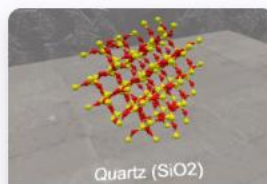
# MolecularWebXR

Welcome to the new era of scientific collaboration!

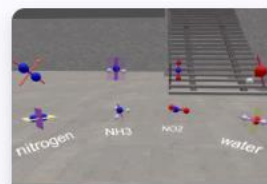
Select one of our pre-built scenes or start with an empty one:



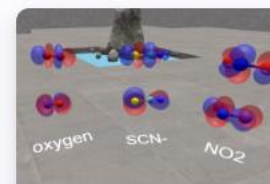
Empty room



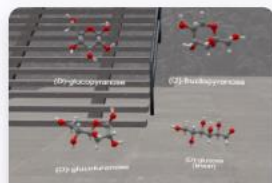
Materials and Crystals



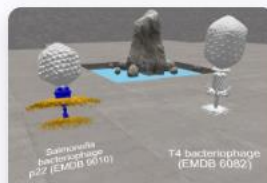
Symmetry



Orbitals



Isomerism



Structural Biology

[Back to menu](#)

EPFL

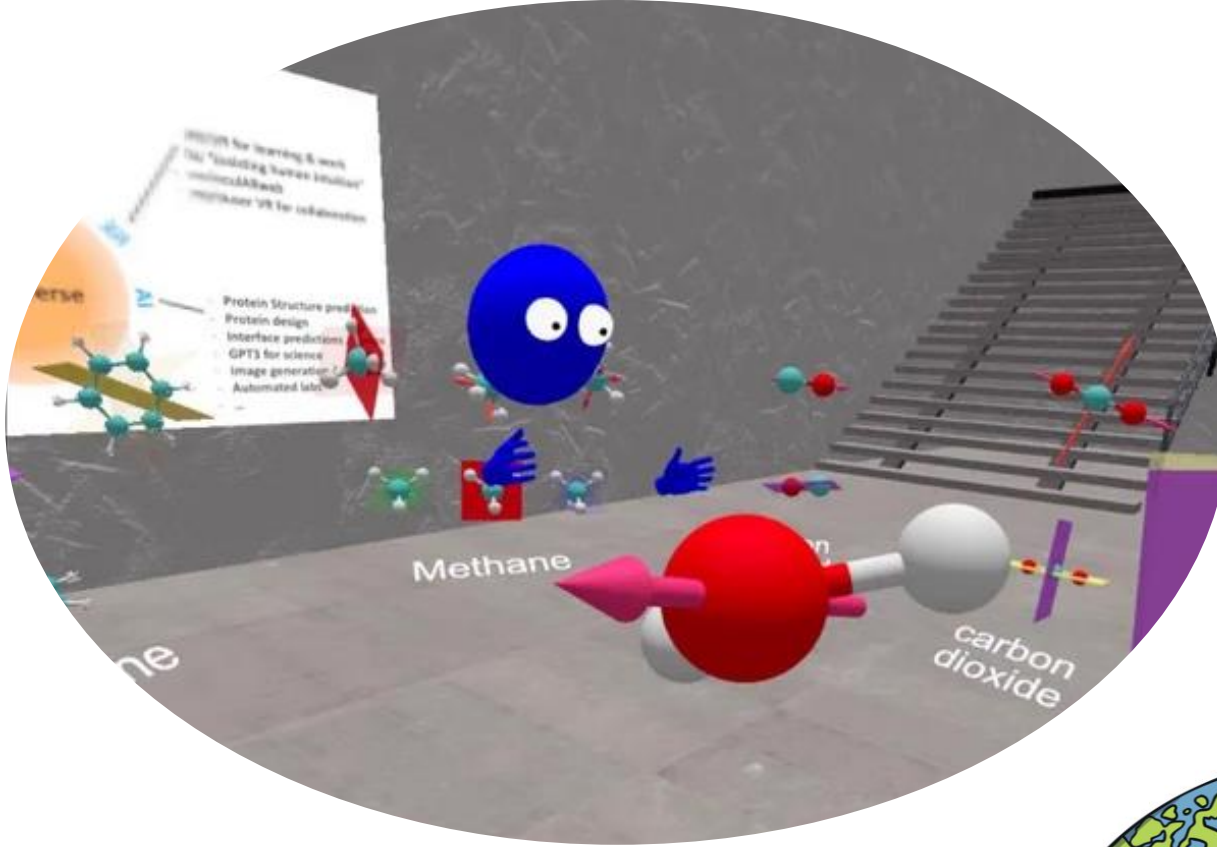
Swiss National  
Science Foundation







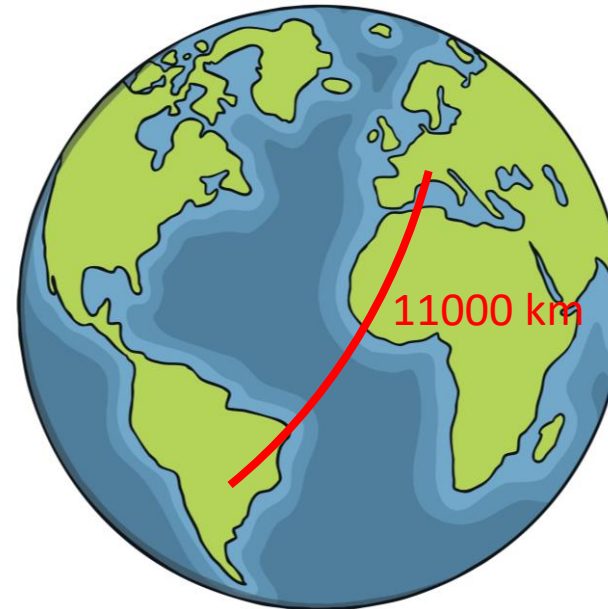




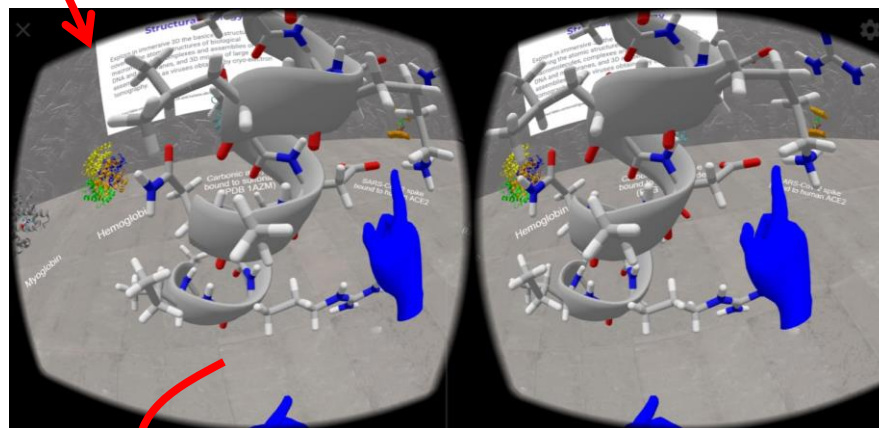
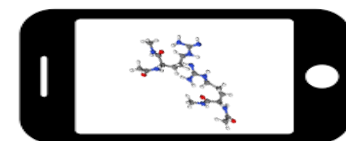
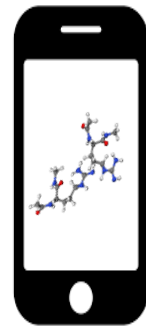
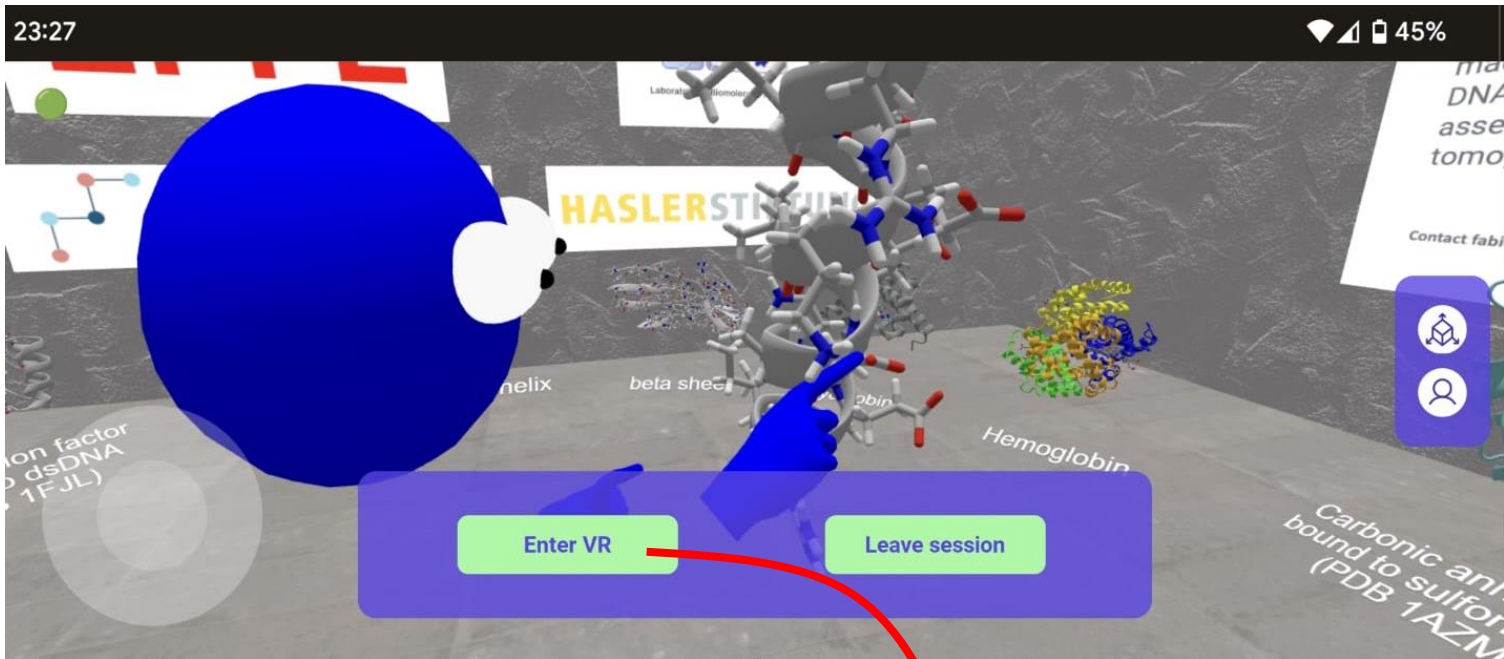
**Remote teaching and remote collaboration,  
immersive and smooth over the internet.**

**Built-in audio.**

**With high-end VR headsets, or on a budget.**





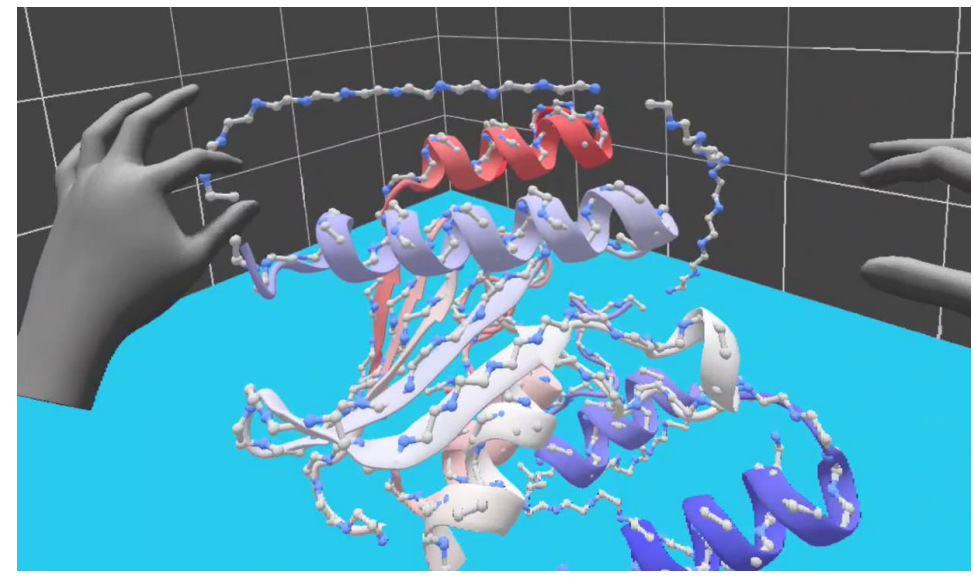




MolecularWebXR

*Out in 1-2 weeks*

***“HandMol”***



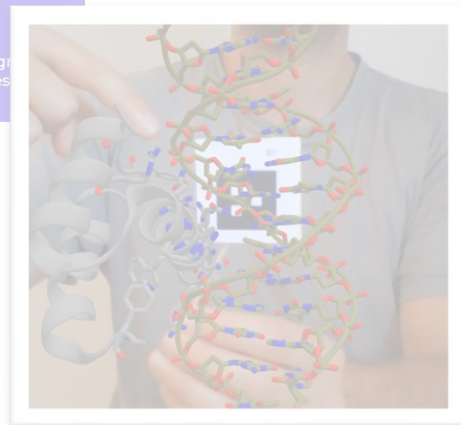
***Working prototype out in 1-2 months***



MolecularWeb

A website for chemistry and biology education through augmented reality, available out of the box in commodity devices

***Rolling since 2020***



## Work done by... + Collaborators

- F. Cortés Rodríguez
- The Dal Peraro lab esp. L. Krapp and F. Teixeira Pinto Meireles
- G. Frattini and D. Moreno (UNR, Argentina)
- L. Stemkoski (Adelphi U., USA)
- A. Roitberg (U. Florida, USA)

<https://go.epfl.ch/luciano>

## Key references

- F. Cortés Rodríguez et al. *Nat. Comp. Sci.* 2021
- F. Cortés Rodríguez et al. *J. Mol. Graph. Model.* 2022
- F. Cortés Rodríguez et al. *Chimia* 2022 and 2023
- L.A. Abriata *PeerJ Comp. Sci.* 2020
- L.A. Abriata *DNA and Cell Biology* 2021
- Blog articles centralized at <https://go.epfl.ch/molecularweb>

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**Swiss National  
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**HASLERSTIFTUNG**