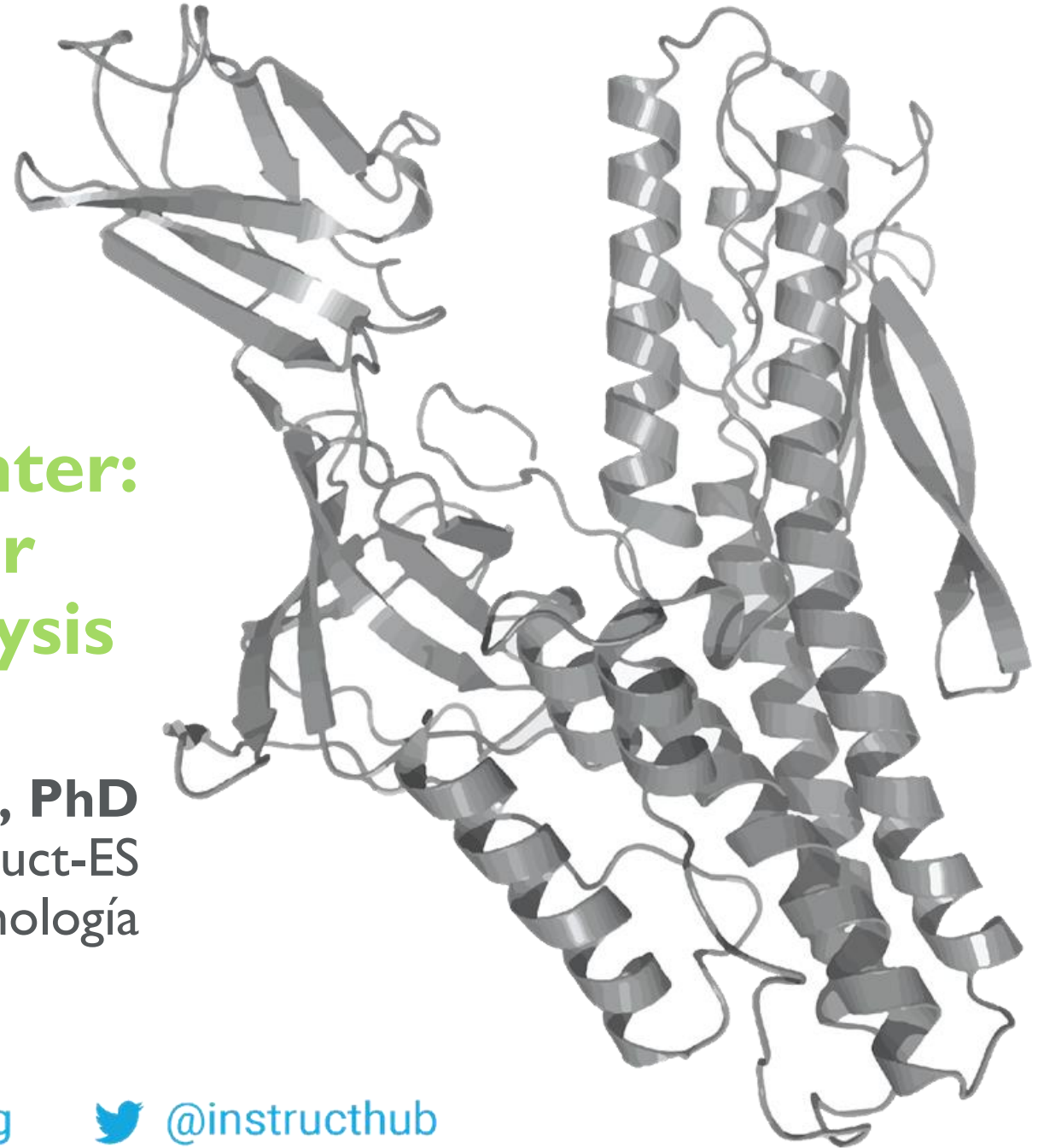




**Instruct Image Processing Center:
An Instruct-ERIC service for
CryoEM Single Particles Analysis**

Marcos Gragera Cabezudo, PhD
Instruct-ES

JM Carazo's Lab - Centro Nacional de Biotecnología



instruct-eric.eu



admin@instruct-eric.org




[@instructhub](https://twitter.com/instructhub)


Instruct-ERIC (https://instruct-eric.org/)


Open **free** access to high-end **structural biology** services and techniques


 Belgium

 Latvia

 Czech Rep...

 EMBL

 Finland

 France

 Israel

 Italy



Instruct-ERIC @instructhub · May 10

Greece and Slovenia are now Members of Instruct-ERIC!

Following approval from Council, both are now Members, and researchers from these countries will soon be able to receive funded access to structural biology infrastructure.

Find out more - instruct-eric.org/news/instruct-... @EIEgr



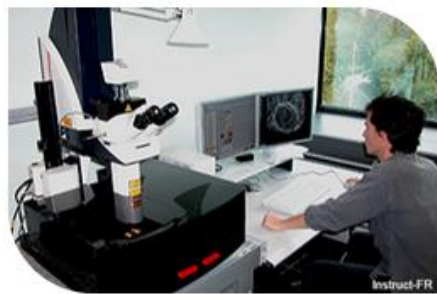
Instruct-ERIC (<https://instruct-eric.org/>)

Open free access to high-end **structural biology** services and techniques



Sample Preparation

Crystallisation
Nanobody Discovery
Protein Production



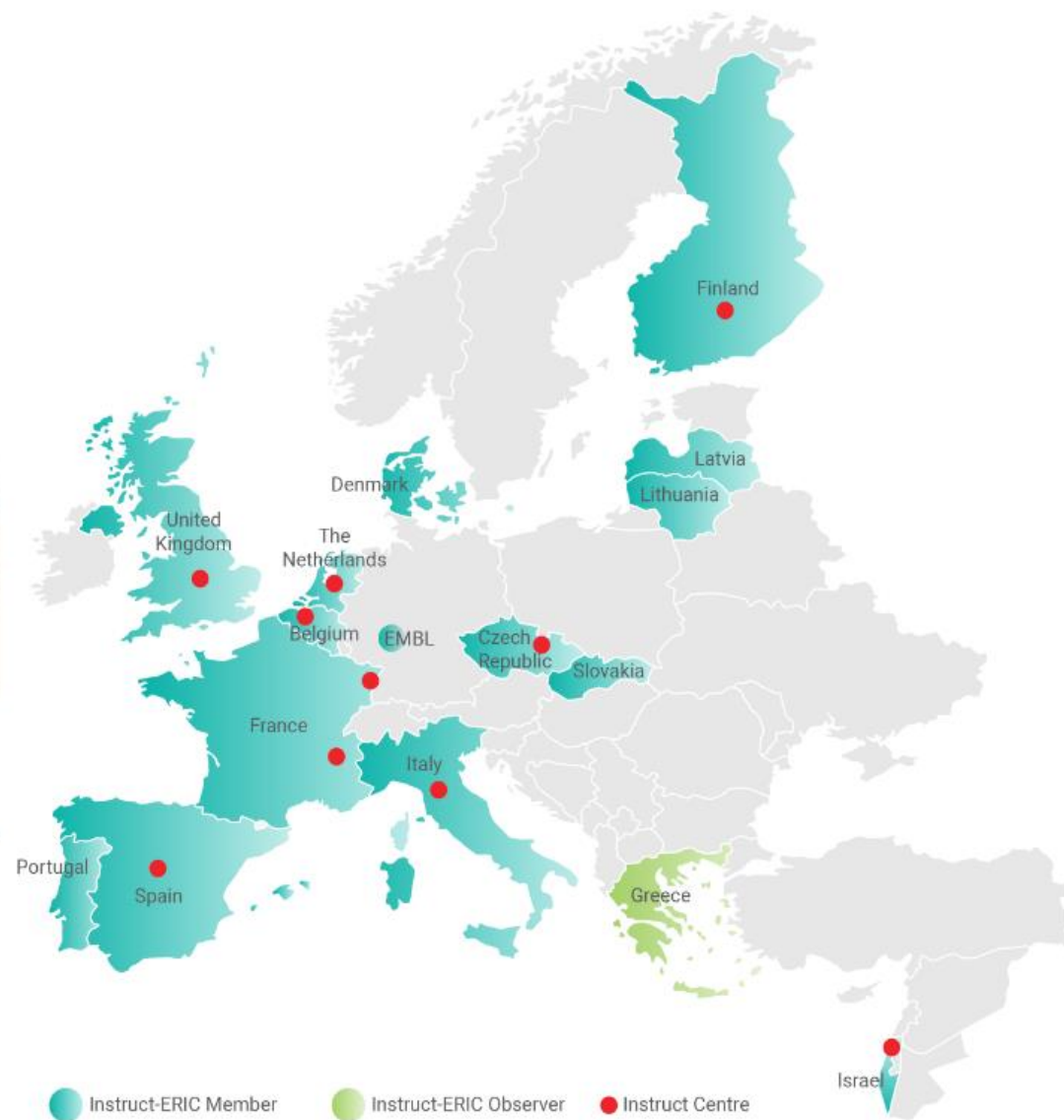
Biomolecular Analysis

Imaging
Mass Spectrometry
Molecular Biophysics



3D Structural Analysis

Electron Microscopy
Magnetic Resonance Techniques
X-Ray Techniques



Instruct-ERIC (<https://instruct-eric.org/>)

Instruct Centre ES

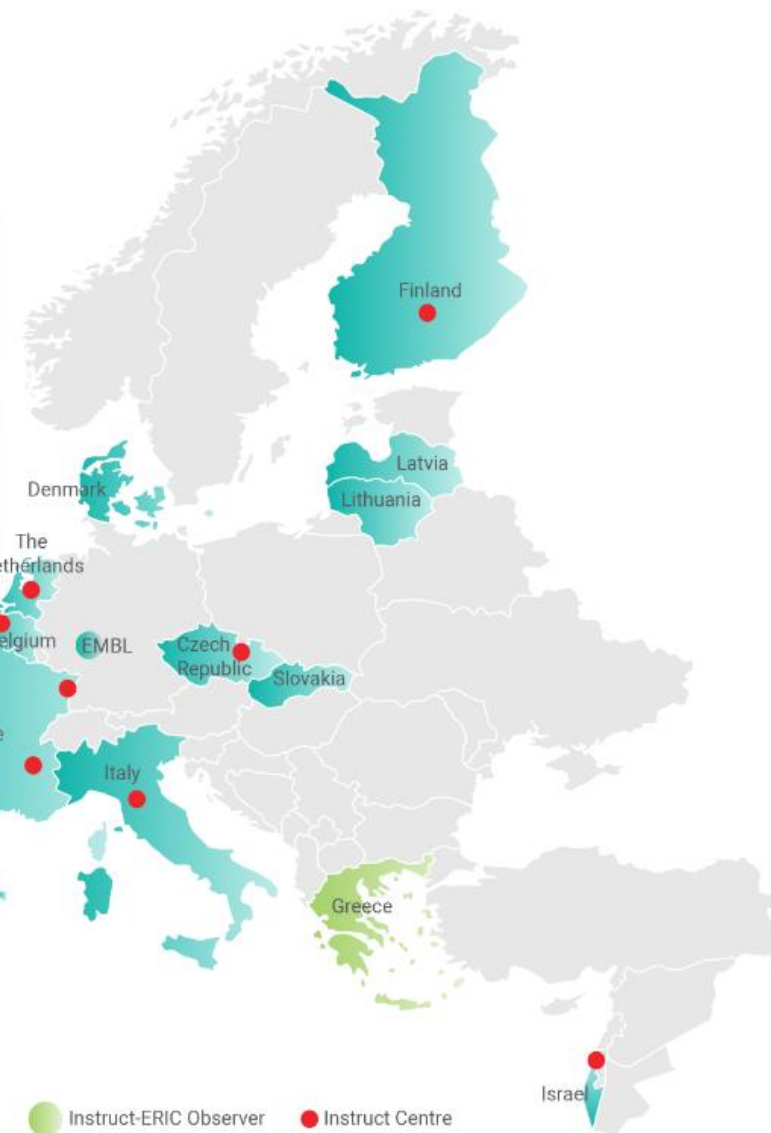
Open free
biology



CryoEM CNB-CSIC



Instruct Image Processing Center (I2PC)



Sample Preparation

- Crystallisation
- Nanobody Discovery
- Protein Production

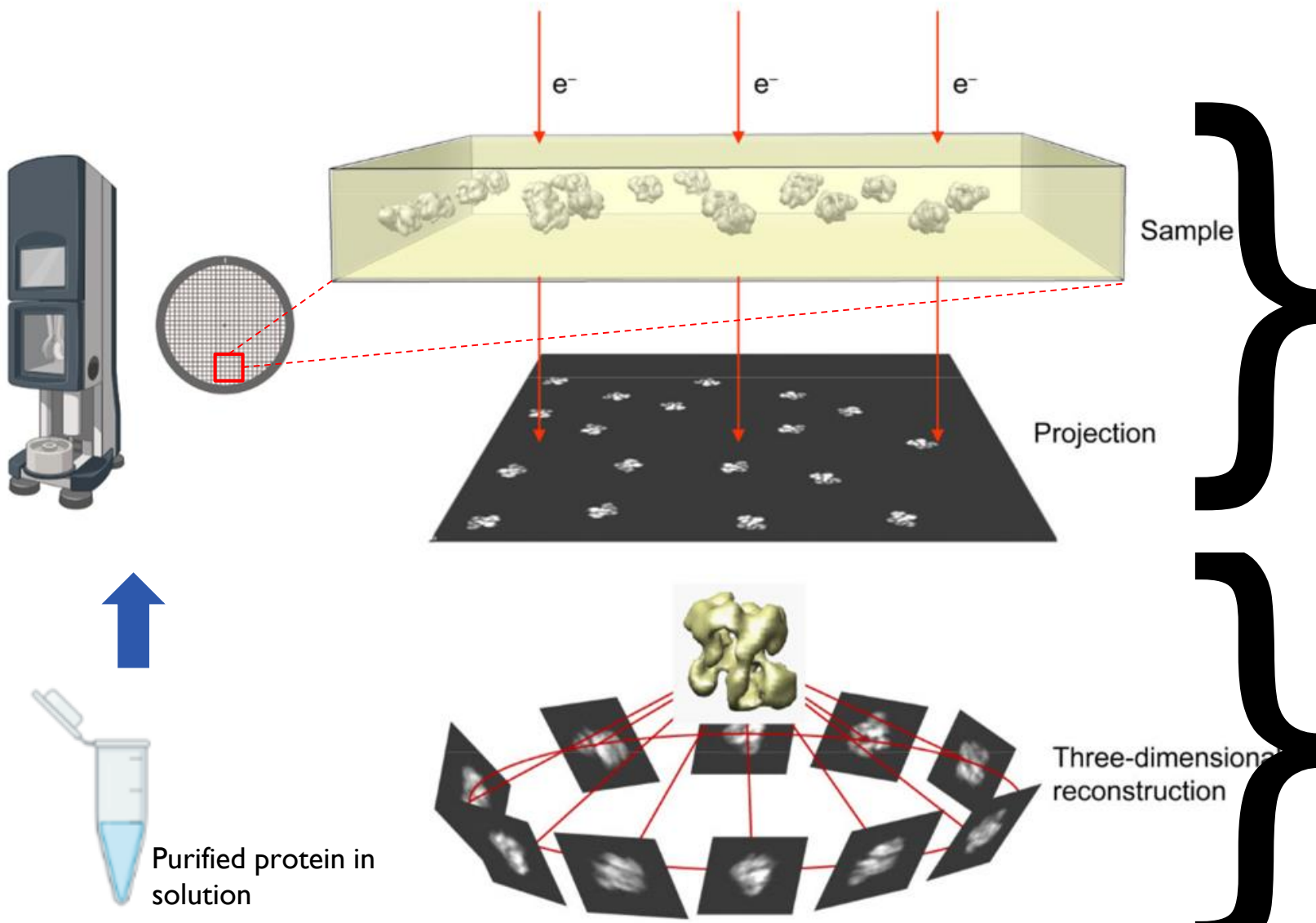
Biomolecular Analysis

- Imaging
- Mass Spectrometry
- Molecular Biophysics

3D Structural Analysis

- Electron Microscopy
- Magnetic Resonance Techniques
- X-Ray Techniques

Instruct-ERIC - Our services



FlexibilityHub
Exploring conformational heterogeneity from cryo-EM images



CryoEM CNB-CSIC

Instruct Image Processing Center
(Single Particle Analysis)



Instruct Image Processing Center



Adapted from Wang, 2015. *Sci. China Life Sci.*

CryoEM Facility

Resources

Rocío Arranz
Head of the Facility
(rarranz@cnb.csic.es)



FEI Vitrobot IV



JEOL cryo arm 300 kV



Talos Arctica 200 kV



<https://instruct-eric.org/platform/electron-microscopy-and-cryo-clem-cnbnb-csic-madrid-spain/>



Scientific Contacts



José María Carazo
carazo@cnb.csic.es



Carlos Óscar Sánchez Sorzano
coss@cnb.csic.es



Blanca Benítez
blanca@cnb.csic.es

Technical Contacts



Marcos Gragera
mgragera@cnb.csic.es



Roberto Melero
rmelero@cnb.csic.es



Main workstation:

20 TB HDD, 32 cores, 256 GB RAM, 8x GPU 12 GB memory (GeForce 1080)

Virtual machine:

5TB disk HDD, 128 GB RAM, 2 GPUs with 32 GB memory

Storage:

+200 TB for raw data and long-term storage



Instruct-ERIC - Proposal pipeline

Email to: mgragera@cnb.csic.es

Proposal submission

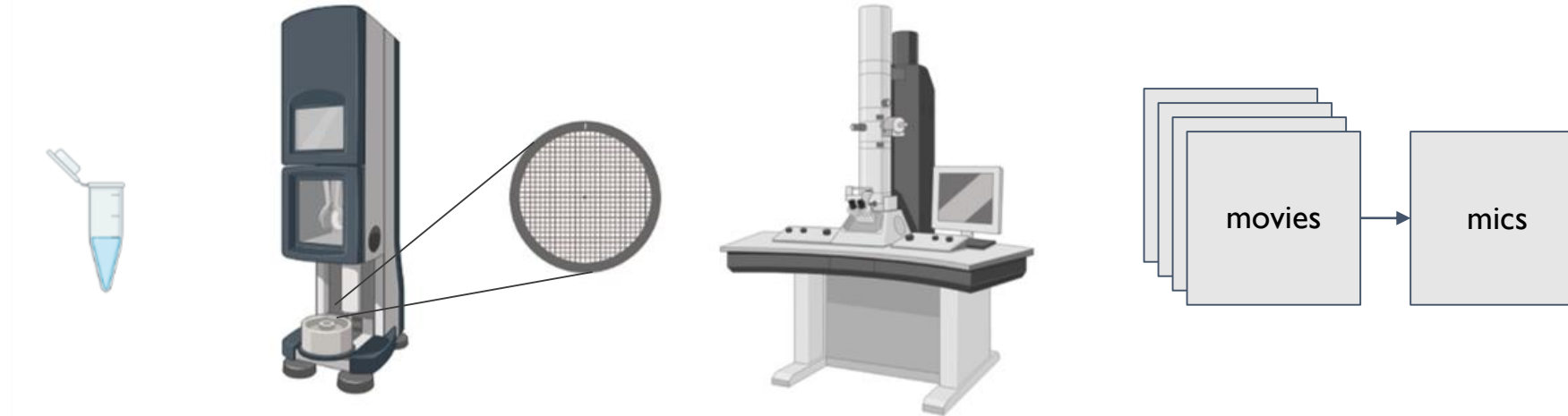
Data transfer

Closure

Proposal evaluation

Image processing
(2-3 weeks)

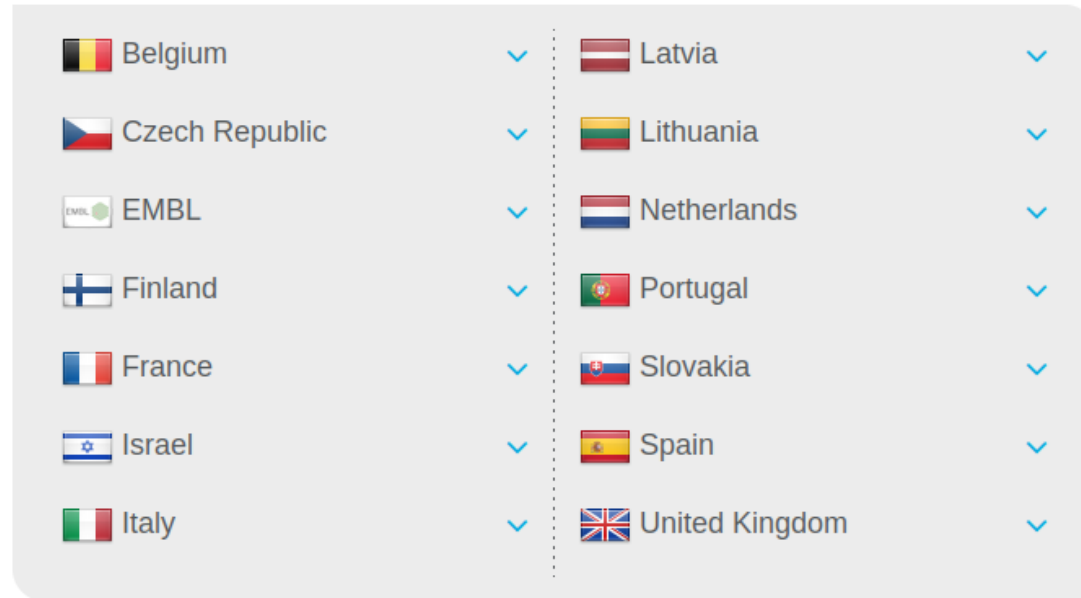
Instruct-ERIC - Why can it be interesting?



- If you are interested in the **3D structure** of your protein of interest:
 - Reluctant to crystallization/NMR.
 - Tolerance to impurities, flexibility.
 - Few μL of samples required.
 - Conformational landscape vs snapshot.
 - No previous experience in cryo-EM is required

Instruct-ERIC - What do you need to apply?

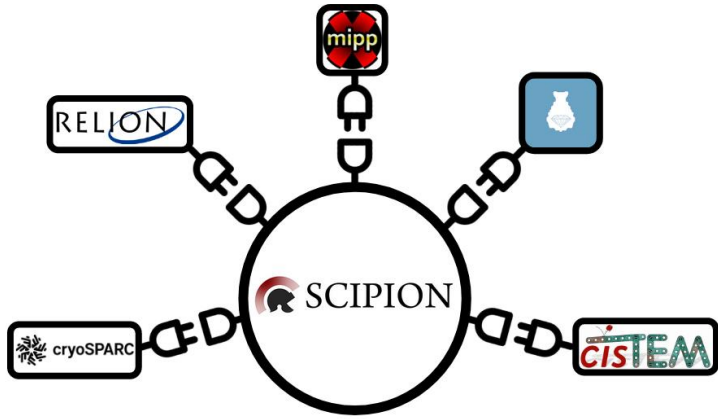
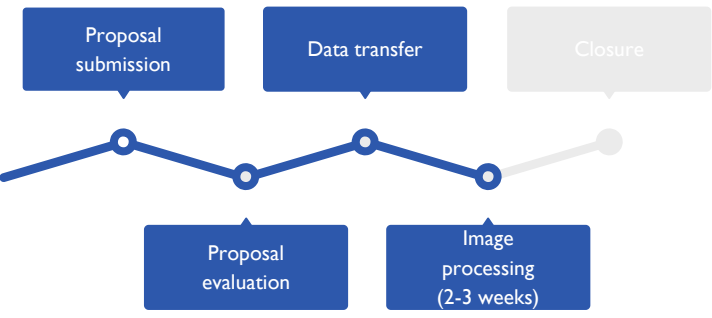
- Being from an institution of an Instruct member country.



- Starting material: purified protein in solution / dataset already collected.



Instruct-ERIC - Image processing



Advantages:

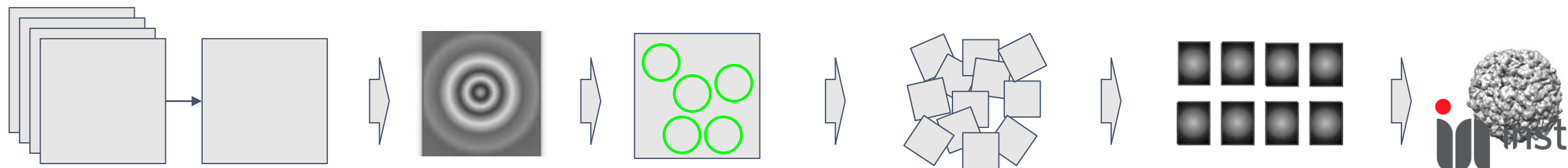
- State-of-the art software for SPA
- Multi-algorithmic approach
- Traceability
- Project transfer

Strong interaction with user



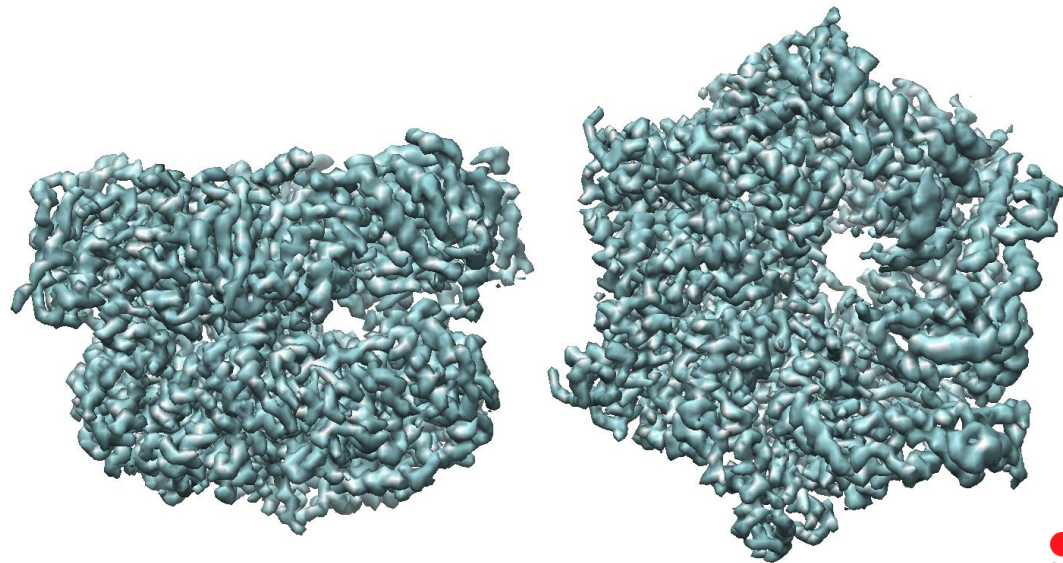
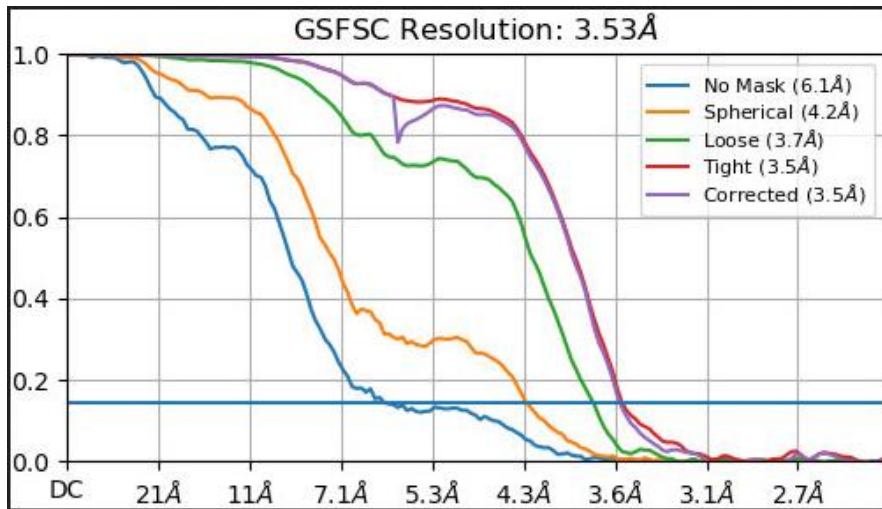
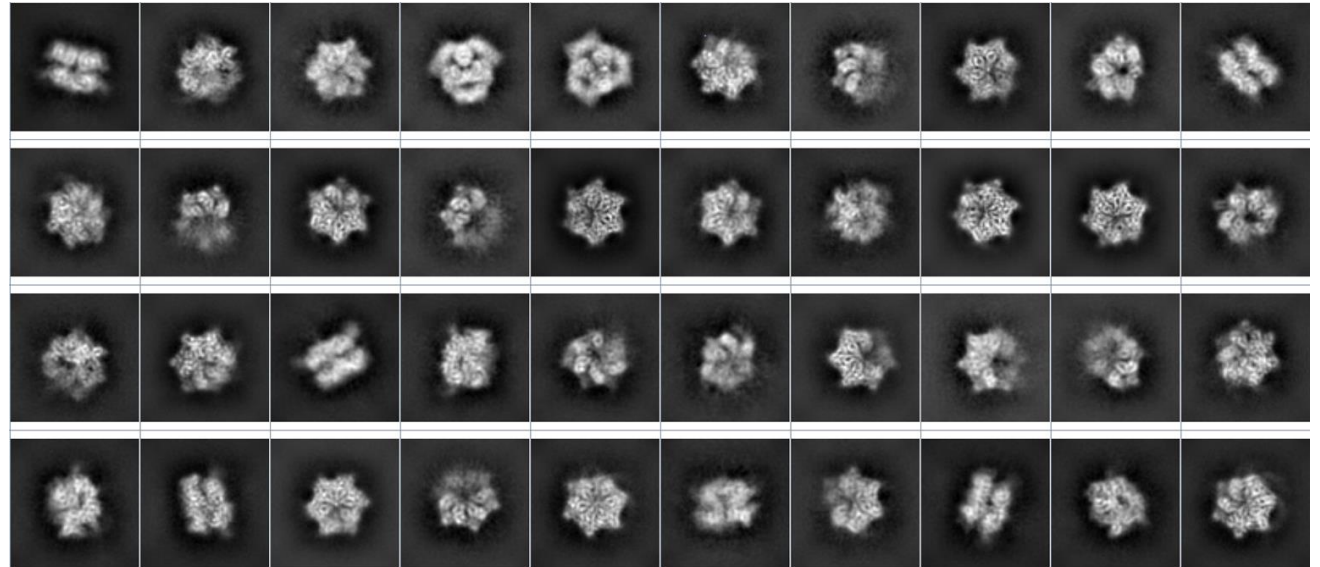
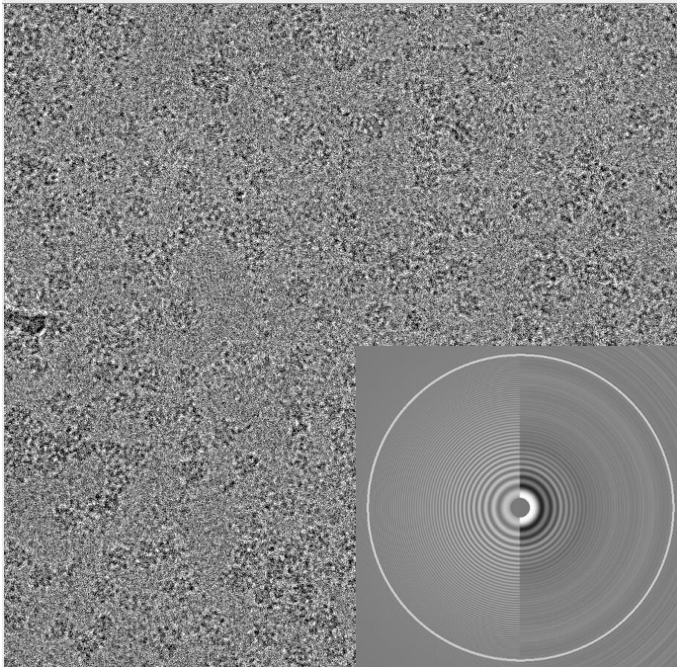
Each dataset is assigned with 10 Access Units (2 weeks of work)

What can we do during this time?



Scientific Outputs

Talos Arctica (200 kV)



2023

A Fijivirus Major Viroplasm Protein Shows RNA-Stimulated ATPase Activity by Adopting Pentameric and Hexameric Assemblies of Dimers

Gabriela Llauger, Roberto Melero, Demián Monti, Gabriela Sycz, Cristián Huck-Iriart, María L. Cerutti, Sebastián Klinke, Evelyn Mikkelsen, Ariel Tijman, Rocío Arranz, Victoria Alfonso <https://orcid.org/0000-0002-9167-6107>, Sofia M. Arellano <https://orcid.org/0000-0002-9728-6599>, Fernando A. Goldbaum, Yann G. J. Sterckx, José-María Carazo, Sergio B. Kaufman, Pablo D. Dans, Mariana del Vas delvas, Lisandro H. Otero

Instruct Access Project (PID):5526

iNEXT-Discovery Access Project (PID): 5391

2022

Nanobodies Protecting From Lethal SARS-CoV-2 Infection Target Receptor Binding Epitopes Preserved in Virus Variants Other Than Omicron

Casasnovas J.M., Margolles Y., Noriega M.A., Guzmán M., Arranz R., Melero R., Casanova M., Corbera J.A., Jiménez de Oya N., Gastaminza P., Garaigorta U., Saiz J.C., Martín-Acebes M.A., and L.A. Fernández.

Frontiers in Immunology

Instruct Access Project (PID): 16168 and 14989

Structure of the drug target ClpC1 unfoldase in action provides insights on antibiotic mechanism of action.

Katharina Weinhäupl, Marcos Gragera, M. Teresa Bueno-carrasco, Rocío Arranz, Olga Krändor, Tatos Akopian, Raquel Soares, Eric Rubin, Jan Felix, Hugo Fraga.

J. Biol. Chem.298(11): 102553

iNEXT Access Project (PID): 15695

2021

3D architecture and structural flexibility revealed in the enzyme.

Melisa Lázaro, Roberto Melero, Charlotte Huet, Jorge Luciano A. Abriata, Pedro M. Alzari, Mikel Valle & Mar
Communications Biology. 4: 684
Instruct Access Project (PID): 6258

Near-atomic structure of an adenovirus reveals a complex of proteins.

Roberto Marabini, Gabriela N. Condezo, Mart Krupov
Science Advances: 7(14): eabe6008
Instruct Access Project (PID): 1395

Self-assembly and regulation of protein cages from peptides.

Lapenta F, Aupič J, Vezzoli M, Strmšek Z, Da-Vela S, Sv
Nature Communications. 12: 939
iNEXT Access Project (PID): 1824

2020

Continuous flexibility analysis of SARS-CoV-2 spike prefusion structures.

Melero R, Sorzano COS, Foster B, Vilas JL, Martínez M, Marabini R, Ramírez-Aportela E, Sanchez-Cañó L, Losana P, Fonseca-Reyna YC, Conesa P, Wrapp D, Chacon P, McLellan JS, Tagare HD, Ca
IUCrJ. 7(6): 1059 – 1069
Instruct Access Project (PID): 11775

Ribosome-associated vesicles: A dynamic subcompartment of the endoplasmic reticulum in secretory cells.

Carter SD, Hampton CM, Langlois R, Melero R, Farino ZJ, Calderon MJ, Li W, Wallace CT, Tran NH, Pemberton J, Morgenstern TJ, Eisenman L, Aguilar JI, Greenberg NL, Levy ES, Yi E, Mitchell WG, R
EW, Aslanoglou D, Courel M, Freyberg RJ, Javitch JA, Wills ZP, Area-Gomez E, Shiva S, Bartolini F, M, Fish KN, Walter P, Balla T, Fass D, Wolf SG, Watkins SC, Carazo JM, Jensen GJ, Frank J, Freyber
Sci Adv. 6(14):eaay9572
Instruct Access Project (PID): 1222

Regulation of RUVBL1-RUVBL2 AAA-ATPases by the nonsense-mediated mRNA decay factor DHX38.

Andres López-Perrote, Nele Hug, Ana González-Corpas, Carlos F Rodríguez, Marina Serna, Carm
Boskovic, Rafael Fernandez-Leiro, Javier F Caceres, Oscar Llorca.
eLife. 2020; 9:e63042
Instruct Access Project (PID): 10707

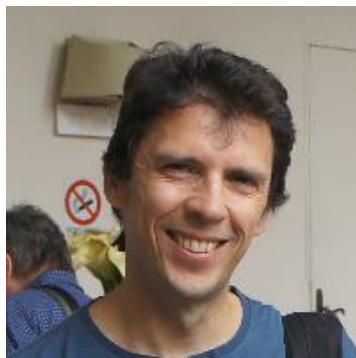
Capping pores of alphavirus nsP1 gate membranous viral replication factories.

Rhian Jones, Gabriel Bragagnolo, Rocío Arranz & Juan Reguera.
Nature.
Instruct Access Project (PID): 7046

Scientific Contacts



José María Carazo
carazo@cnb.csic.es



**Carlos Óscar
Sánchez Sorzano**
coss@cnb.csic.es



Blanca Benítez
blanca@cnb.csic.es

Admin Contacts

Instruct Centre ES



CryoEM CNB-CSIC

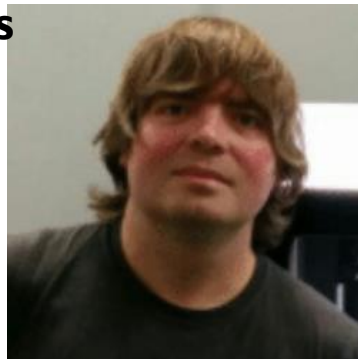


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Marcos Gragera
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Thank you!



<https://instruct-eric.eu/centre/centre-for-image-processing/>



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