



# HighNESS - Project Overview, Goals and Objectives

Valentina Santoro

### ESS Current moderator



- The design of ESS moderator was based on the novel concept of low-dimensional moderators . It is a single **high-brightness** moderator system placed on top of the spallation target.
- All of the first 15 instruments built, plus a test beam line, will view that moderator



#### Development of <u>High</u> Intensity <u>N</u>eutron Source at the <u>E</u>uropean <u>S</u>pallation <u>S</u>ource

The main objective of the HighNESS project is to develop a second neutron source, located below the spallation target, with a high-intensity moderator able to deliver

- a larger total cold neutron flux,
- provide high intensities at longer wavelengths in the spectral regions of Cold (4-10 Å), Very Cold (10-40 Å), and Ultra Cold (several 100 Å) neutrons
- In particular, ESS would provide the first intense VCN source in the world.



Offering both unprecedented brilliance, flux, and spectral range in a single facility, will make ESS the most versatile neutron source in the world thereby keeping the European scientific community at the forefront of research progress



### ESS future instruments



**WP7, WP8** 

- The design study will fill gaps in the available instruments and capabilities at ESS, including a program of fundamental physics, and design of condensed-matter science instrument that can strongly profit from using neutrons with longer wavelengths
- Many other experiments and applications would strongly profit from a source with different, complementary characteristics, respect to the current ESS source



### Advanced Reflector

- Recent years have seen intense research towards novel reflector materials both for the moderator and for the beam extraction systems
- In order for these materials to be used at ESS, they have to be characterized. We have a plan to acquire the missing information experimentally (WP3)
- With the input from measurements, in WP2 these materials will be implemented in computer code



Nanodiamondas particle





# The HighNESS Consortium



As required by the cross-disciplinary nature of this work, HighNESS comprises leading experts in simulations, neutronic design and engineering, material characterization using neutron scattering techniques, and the design of instruments/experiments for slow neutrons.

Participant No.	Participant organisation name	Short name	Country
1 (coord.)	European Spallation Source ERIC	ESS	SE
2	Institut Max von Laue – Paul Langevin	ILL	FR
3	Forschungszentrum Julich Gmbh	FZJ	DE
4	Universita' Degli Studi Di Milano-Bicocca	UNIMIB	IT
5	Danmarks Tekniske Universitet	DTU	DK
6	Paul Scherrer Institut	PSI	CH
7	Mirrotron Multilayer Laboratory Ltd	Mirrotron Ltd	HU
8	Stockholms Universitet	SU	SE









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# Governance of the Project

**European Commission Steering Board** WP1: Project Coordination (ESS) WP2: Software WP5: Engineering WP3: Material WP4: Moderators WP6: Advanced Development Reflector Characterization **Neutronic Design** with Neutrons ESS, UNIMIB ILL, ESS MIRROTRON, ESS, JULICH DTU, ESS, MIRROTRON DTU, ILL WP7: Condensed WP8: WP9: Computing WP10: Fundamental Infrastructure Matter Science **Dissemination and Physics** Outreach PSI, ESS ILL, SU ESS, DTU ESS **General Assembly** 

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DM = Deliverable and Milestone

### Conclusions



- HighNESS project has just started
- Several new young people have been hired and are already part of the projects. Their training is on-going or will start soon
- Several meeting already happening:
  - Bi-Weekly meeting with the WP-leaders
  - WP internal meeting
  - Meetings between different WPs



# INFRADEV-01-2019-2020 – Design Studies

TITLE	ACRONYM	PROJECT ID
<u>Clock Network Services - Design Study</u>	CLONETS-DS	951886
DESIGN STUDY FOR A EUROPEAN VACCINE INFRASTRUCTURE	TRANSVAC-DS	951668
Development of High Intensity Neutron Source at the European Spallation Source	HighNESS	951782
Future Circular Collider Innovation Study	FCCIS	951754
Gliders for Research, Ocean Observations and Management: Infrastructure and Innovation	GROOM II	951842
Joint European Research Infrastructure of Coastal Observatories - Design Study	JERICO-DS	951799
Observatory for Political Texts in European Democracies - A European Research Infrastructure	OPTED	951832
Design Study	SLICES-DS	951850
Superconducting magnets for the European Magnet Field Laboratory	SuperEMFL	951714
Towards an Atacama Large Aperture Submillimeter Telescope	AtLAST	951815



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