## Meeting dell'iniziativa specifica MONSTRE
## Milano, 11 May 2023- 12 May 2023
## MONSTRE: (**MO**deling **N**uclear **ST**ructure and **RE**actions)

- Report of the activities (current project)

- **New Project**

  - Continuity with old project

  - Same WPs structure or different?

  - New ideas/subjects/goals

  - Collaborations among units

- **Deadlines**

  - List of (up to) 5 referees, 20.5.23

  - New Project, 31.5.23

Referees list, up to 5 names, before 20.5.23

Internal referees (Vidana, D'Alesio) choose
- 1 among them
- plus another 1 not in the list

Previous suggested list
- Jacek DOBACZEWSKI
- Richard J. FURNSTHAL
- Francesca GULMINELLI
- Alexandros GEZERLIS
- Takashi NAKATSUKASA

Other suggestions:
- Antonio Moro
- Denis Lacroix ?
- Morten Hjorth-Jensen
- Dario Vretenar ?
- Alexander Volya
- Jouni Suhonen
- Kazuyuki Ogata
- Kenichi Yoshida
-
-
- ...

**Referee's Questionnaire**

## Questionnaire

### 1. Quality and relevance of the proposed research activity:

*How relevant is the field of research at the international level? Does the project address important challenges in the field?*

Please grade accordingly:                    (A=Very Good, B=Good, C=Fair, D=Poor)

Justification and comments:

### 2. Research plan, methodology and strategy:

*Is the research plan clearly stated, soundly based and feasible? Are the (conceptual and technical) employed methods suitable?*

Please grade accordingly:                    (A=Very Good, B=Good, C=Fair, D=Poor)

Justification and comments:

### 3. Project impact:

*Does the project have the potential to improve the current state-of-the-art in the field?*

Please grade accordingly:                    (A=Very Good, B=Good, C=Fair, D=Poor)

Justification and comments:

**Referee's Questionnaire**

### 4. Research team qualification:

*With regard to the scientific qualification of each Unit and its role in the development of the research project, how well designed and qualified is the research team to conduct the project?*

Please grade accordingly:                                    (A=Very Good, B=Good, C=Fair, D=Poor)

Justification and comments:

### 5. Global evaluation:

*Taking into account of the four evaluations above, what is the overall scientific assessment of the IS?*

Please grade accordingly:                                    (A=Very Good, B=Good, C=Fair, D=Poor)

Please comment on specific points of strength and/or weakness

---

**IS proposals are ranked** according to the following levels:
level 1): with grades A and at most one grade B in total, considering both referee reports;
level 2): with grades A and at most two grades B in total, considering both referee reports;
level 3): with more than two grades B or C/D, considering both referee reports

**Purpose**
**-** allocating the INFN post-doc grants
- No impact on budget allocated for each IS !

# Proposal template
(same of the previous one)

- **Abstract**

- **Units (and staff)**

- **Status of the relevant research field;** scientific context, objectives, methodology and envisaged achievements of the proposed program(max 2 pages)

- **Proposed activities and role of the various Research Units** (max 3 pages)

- **List of the most significant publications of the last five years of each Research Unit related to the proposal** (up to 5 publications for each Unit)

- **List of the main national or international collaborations related to the proposal**

# Important Deadlines and Workflow

- **Referees** List of (up to) 5 referees, 20.5.23

  ➢ The best would be to have the list at the end of the meeting

  ➢ Suggestions till the 18.5

- **Project (31.5.23)**

- Each speaker should send the text for the two sections of the project **(Before 18.5)**

  A) Status of the relevant research field; scientific context, objectives, methodology and envisaged achievements of the proposed program
  B) Proposed activities and role of the various Research Units

- Each local coordinator should send the List of 5 Publications and Collaborations **(Before 18.5)**

- **First Draft within 20.5**

- **From 21.5 to 26.5, draft improving on a common file (Google Drive, ...)**

- **To be finalized (29-31 May)**

# Referees list, up to 5 names, before 20.5.23

Internal referees (Vidana, D'Alesio) choose
- 1 among them
- plus another 1 not in the list

Previous suggested list
- Jacek DOBACZEWSKI
- Richard J. FURNSTHAL
- Francesca GULMINELLI
- Alexandros GEZERLIS
- Takashi NAKATSUKASA

Other suggestions:
- Antonio Moro
- Denis Lacroix ?
- Morten Hjorth-Jensen
- Dario Vretenar ?
- Alexander Volya
- Jouni Suhonen
- Kazuyuki Ogata
- Kenichi Yoshida
-
-
- ...

# MONSTRE: Current Work-Package(WP) Structure

**WP1: Modern Approaches to Nuclear Structure**

**WP2: Collective phenomena and nuclear correlations**

**WP3: Physics of exotic nuclei**

**WP4:Electroweak probes**

**WP5: Nuclei at high energy and temperature, and nuclear matter**

**WP6: Connection to Evolving Technologies and Applications**

| Publications | 2021 | 2022 |
|---|---|---|
| WP1 | 22 | 14 |
| WP2 | 10 | 13 |
| WP3 | 12 | 10 |
| WP4 | 9 | 10 |
| WP5 | 2 | 3 |
| WP6 | 4 | 12 |
| Tot | 59 | 62 |

From "Consuntivi".

*"Error bars"* not included!!!

Problems:
- Overlap between different WPs (especially [1,2,4], [2,3], [3,5])
- "Preventivi e consuntivi" according to WPs (time consuming)
- Some subjects were missing (to be added … )
- Simplification? 3/4 main WPs with sub-WPs.

# New Structure?

## WP1 Ab initio techniques and effective field theories

- Two and Three-Body Forces
- Nuclear-EFT
- **Interactions fitted on 2NN data (Chiral potentials, ...)**
- **Many body methods: SCGF, QMC, SM, ...**
- **Microscopic Optical Potentials**
- **EDFs based on ab-initio calculations**
- **Short range correlations ?**

## WP2 Nuclear structure

- **Collective phenomena and spin-isospin excitations**
- **EoS (astrophysical and terrestrial constraints)**
- **Four-body and clustering effects**
- **Physics with radioactive beams (exotic nuclei and modes)**
- **Electroweak probes (neutrino's physics, parity violation, ...)**
- **Beyond MF models (PVC, Second RPA, WP1 methods, ...)**
- **Discrete Symmetries and point-groups**
- **Non-spherical and superfluid systems**
- **Isospin symmetry breaking**
- **Bridge with Astrophysics**
- 

## WP3 Nuclear reactions and dynamics

- **Phenomenological OPs**
- **Quantum mechanical and semi-classical models**
- **Transport theories**
- **Constrained Molecular Dynamics**
- **Break-up, two-neutron transfer, heavy-ion reactions, ...**
- **Continuum and weakly bound systems**
- **EoS impact on reactions**
- **Single and Double Charge Exchange Reactions**
- **Pion production in neutron-rich systems**
- **Merging of structure and reaction theories (bridge with WP2)**

## WP4 Quantum computing and machine learning

- **Quantum computing-based algorithms**
- **Machine learning techniques**
- **Variational Quantum Eigensolvers**
- **Network quantum states**
- **High Performance Computing?**

- 
- 
-

# Other options:

## Option A

- **WP1 Ab initio techniques and effective field theories**
- **WP2 Nuclear structure**
- **WP3 Nuclear reactions and dynamics**
- **WP4 Quantum computing and machine learning**

## Option B

- **WP1 Ab-initio derived interactions**
- **WP2 Nuclear spectroscopy and excitations**
- **WP3 Nuclear matter under extreme conditions**
- **WP4 Connection to Evolving Technologies and Applications**

## Option C

- **WP1 ...**
- **WP3 ...**
- **WP2 ...**
- **WP4 ...**

## Option D

- **WP1**
- 
- **WPs**