

Iniziativa Specifica: NUCSYS

1 Luglio 2022

In ricordo di Sergio Rosati

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Title: The strongly correlated nuclear system: effective interactions, models, reactions, fundamental symmetries and applications

Responsabile Nazionale: Alejandro Kievsky

Unita' e Responsabili Locali:

- Lecce: Luca Girlanda
- Padova: Luciano Canton
- Pisa: Alejandro Kievsky
- Torino-Pavia: Maria Benedetta Barbaro
- Trento: Winfried Leidemann

Composizione dell'unita' di Pisa:

- Alejandro Kievsky (PR, afferenza al 100)
- Laura E. Marcucci (PO, afferenza al 100)
- Michele Viviani (PR, afferenza al 100)

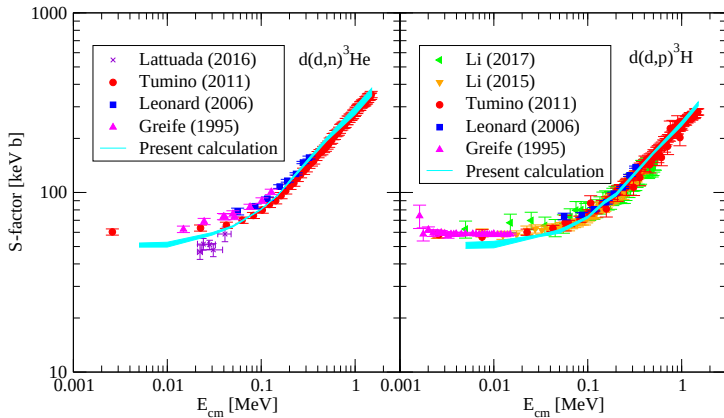
Temi di ricerca

The present project intends to describe particular aspects of atomic nuclei which are relevant for the progress in the knowledge of fundamental interactions.

Argomenti seguiti principalmente a Pisa:

- Ab-initio approaches in few-nucleon systems to validate and constrain our modern understanding of the nuclear interaction and currents based on the (chiral) effective field theory (EFT) paradigm.

- [1] A comprehensive Study of the three- and four-neutron systems at low energies
M.D. Higgins, C.H. Greene, A. Kievsky and M. Viviani, Phys. Rev. C 103, 024004 (2021)
- [2] Comparative study of ${}^6\text{He}$ β -decay based on different SRG-evolved chiral interactions
A. Gnech, L. E. Marcucci, R. Schiavilla, M. Viviani, Physical Review **C104**, 035501 (2021)
- [3] Implementation and optimization of the PTOLEMY transverse drift electromagnetic filter
A. Apponi et al., JINST **17**, P05021 (2022)
- [4] Measurement of the Nucleon F-2(n)/F-2(p) Structure Function Ratio by the Jefferson Lab MARATHON Tritium/Helium-3 Deep Inelastic Scattering Experiment
D. Abrams et al., Physical Review Letters **128**, 132003 (2022)
- [5] Theoretical study of the $d(d, p){}^3\text{H}$ and $d(d, n){}^3\text{He}$ processes at low energies
M. Viviani, L. Girlanda, A. Kievsky, D. Logoteta, and L.E. Marcucci, in preparation
- [6] The ${}^3\text{He}(\vec{n}, p){}^3\text{H}$ parity-conserving asymmetry
the n3he Collaboration + M. Viviani, L. Girlanda, A. Kievsky, and L.E. Marcucci, in preparation



• The pionless approach and universal properties

[1] Two- and three-nucleon contact interactions and ground-state energies of light- and medium-mass nuclei

R. Schiavilla, L. Girlanda, A. Gnech, A. Kievsky, A. Lovato, L.E. Marcucci, M. Piarulli, M. Viviani, Physical Review C **103**, 054003 (2021)

[2] Efimov physics and connections to nuclear physics

A. Kievsky, M. Gattobigio, L. Girlanda, M. Viviani, Annual Review of Particle and Nuclear Science **71**, 465 (2021)

[3] A Many-Body Density Energy Functional

A. Kievsky, G. Orlandini, M. Gattobigio, Physical Review **A104**, L030801 (2021)

[4] Gaussian Parametrization of Efimov Levels: Remnants of Discrete Scale Invariance

P. Recchia, A. Kievsky, L. Girlanda and M. Gattobigio, Few-Body Systems **63**, 8 (2022)

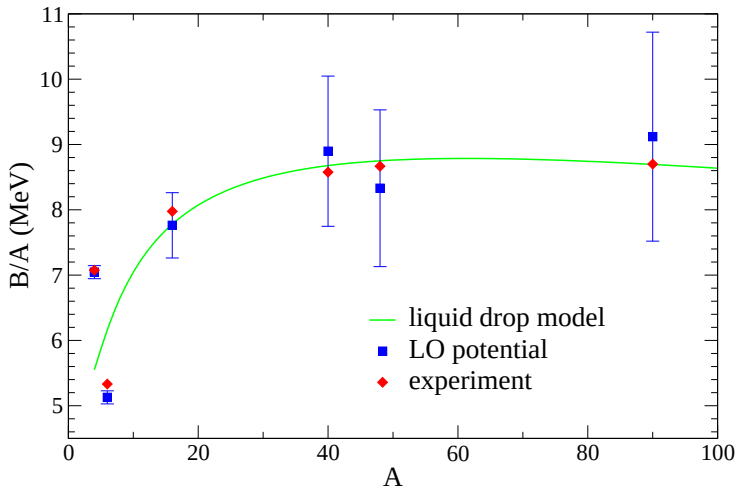
[5] Subleading contributions to N-boson systems inside the universal window

P. Recchia, A. Kievsky, L. Girlanda, and M. Gattobigio, Physical Review A submitted

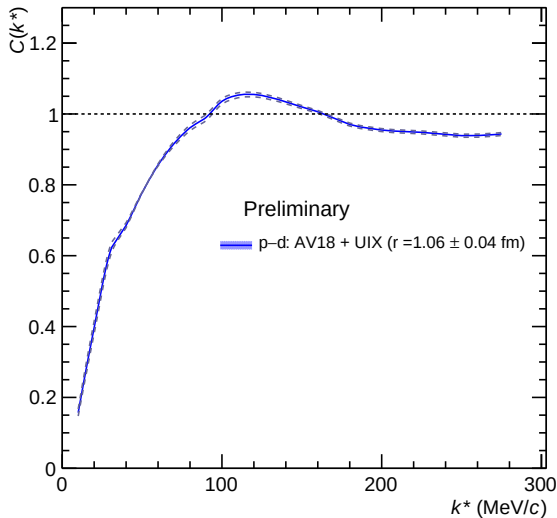
• Fundamental symmetries and applications

[1] The X17 boson and the ${}^3\text{H}(p, e^+e^-){}^4\text{He}$ and ${}^3\text{He}(n, e^+e^-){}^4\text{He}$ processes: a theoretical analysis

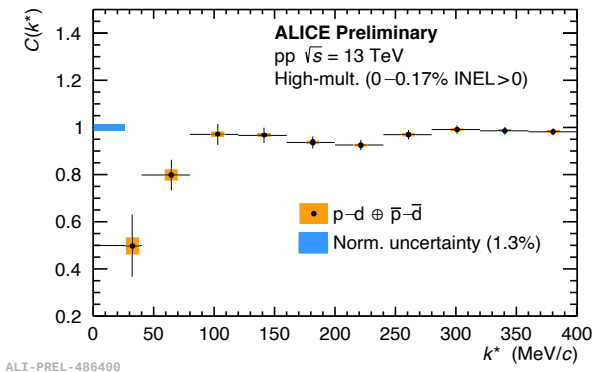
M. Viviani, E. Filandri, L. Girlanda, C. Gustavino, A. Kievsky, L. E. Marcucci, R. Schiavilla, Physical Review **C105**, 014001 (2022)



Collaborazione con ALICE



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Richieste alla sezione:

- Incontro di NUCSYS a Pisa per ripartire con gli incontri di persona, periodo da definire
- Cortona, incontro di Fisica Nucleare Teorica, Ottobre 2023