Laser spectroscopy as a tool for nuclear theories

7-11 October 2019

CEA, Orme des Merisiers Campus, 91191 Gif-sur-Yvette, France

SCIENTIFIC ISSUE

Laser spectroscopy techniques have long been established as a powerful tool for nuclear structure studies. They provide nuclear-model independent properties that are essential for our understanding of the atomic nuclei such as changes in the root-mean-squared charge radii, magnetic and quadrupole moments, and nuclear spins. Owing to recent technical developments carried out at different radioactive beam facilities worldwide, a wealth of data on ground- and isomeric-state properties has become available in regions of the chart of nuclides experimentally unreachable until now [Cam16]. Such results, either concerning observables not accessible by other experimental methods or complementary to the ones obtained via standard techniques, provide important constraints and challenge state-of-the-art theoretical models. In this workshop, the current experimental progress alongside with the modern developments in nuclear theory will be reported, giving the opportunity to explore the interchange of the two with the goal of a deeper understanding of the structure of atomic nuclei.

[Cam16] P. Campbell, I.D. Moore, M.R. Pearson, Prog. Part. Nucl. Phys. 86 (2016) 127.

GOALS

The main goals of the workshop are:

1. To review recent experimental progress in nuclear laser spectroscopy and discuss perspectives of forthcoming campaigns
2. To discuss relevant theoretical developments and perspectives
3. To analyse the impact of precision data on the construction of theoretical models
4. To explore novel ground-state properties that could be inferred from next-generation laser spectroscopy measurements

PROGRAM

Speakers and topics

Introductory lectures

- Piet Van Duppen (KU Leuven)
  Introduction to laser spectroscopy
- Thomas Duguet (CEA Saclay)
  Theoretical description of nuclear observables accessible via laser spectroscopy

Talks

- Michael Bender (IPN Lyon)
  Recent progress in EDF calculations for heavy nuclei
- Mark Bissell (Univ. of Manchester)
  The hyperfine anomaly and the distribution of neutrons
- B. Alex Brown (MSU)
  Mirror nuclei, nucleon skins and the equation of state of nuclear matter

- Jacek Dobaczewski (Univ. of York)
  Nuclear Magnetic Moments in EDF approaches
- Rafael Ferrer (KU Leuven)
  In-gas-jet laser spectroscopy
- Kieran Flanagan (Univ. of Manchester)
  Collinear laser spectroscopy techniques
- Dag Hanstorp (Univ. of Gothenburg)
  High-precision spectroscopy of Negative ions
- Jason D. Holt (TRIUMF)
  Laser spectroscopy as a stringent test for nuclear interactions
- Mustapha Laatiaoui (Univ. Mainz)
  Towards ion mobility measurements of actinides
- Valérie Lapoux (CEA Saclay)
  Elastic proton scattering and matter radii
- Nathalie Lecesne (GANIL)
  Laser spectroscopy at S ^{3}
- Diego Lonardoni (MSU & LANL)
  Quantum Monte Carlo calculations of nuclear charge radii
- Kei Minamisono (MSU/NSCL)
  Recent laser spectroscopy results at NSCL
- Iain Moore (Univ. of Jyväskylä)
  Laser spectroscopy studies at Jyväskylä
- Peter Müller (ANL, Argonne)
  Laser spectroscopy of few-nucleon systems
- Gerda Neyens (CERN/KU Leuven)
  Nuclear moments for nuclear structure studies
- Wilfried Nörtershäuser (TU Darmstadt)
  Laser spectroscopy of highly charged ions
- Takaharu Otsuka (Univ. of Tokyo)
  Precision nuclear structure via the Monte-Carlo shell model
- Sophie Péru (CEA DAM Bruyères-le-Châtel)
  Role of precision measurements in designing energy density functionals
- Francesco Raimondi (CEA Saclay)
  Radii and spectroscopy of medium-mass nuclei from Green's Function theory
- Xavier Roca Maza (Univ. of Milano, INFN)
  How does nuclear structure constrain the equation of state of nuclear matter?
- Bijaya Sahoo (Physics Research Laboratory, Navrangpura)
  Recent progress and challenges in atomic coupled cluster theory
- David Verney (IPN Orsay)
  Perspectives for laser spectroscopy and electron scattering at Orsay
- Deyan Yordanov (IPN Orsay)
  Interplay between nuclear data and atomic calculations in the tin region. Recent developments of collinear laser spectroscopy.

Schedule

Monday 7th		Tuesday 8th		Wednesday 9th		Thursday 10th		Friday 11th	
9:20	Welcome	9:30	**Ferrer**	9:30	**Hanstorp**	9:30	**Sahoo**	9:30	**Lonardoni**
9:30	**Van Duppen**	10:15	Break	10:15	Break	10:15	Break	10:15	Break
11:00	Break	10:45	**Lecesne**	10:45	**Müller**	10:45	**Neyens**	10:45	**Minamisono**
11:30	**Duguet**	11:30	**Dobaczewski**	11:30	**Lapoux**	11:30	**Yordanov**	11:30	**Bissell**
13:00	Lunch	12:15	Lunch	12:15	Lunch	12:15	Lunch	12:15	Lunch
14:30	**Moore**	14:00	**Laatiaoui**	14:00	**Nörtershäuser**	14:00	**Flanagan**	14:00	End
15:15	Break	14:45	Break	14:45	Break	14:45	Break		
15:45	**Brown**	15:15	**Bender**	15:15	**Holt**	15:15	**Otsuka**		
16:30	**Roca Maza**	16:00	**Péru**	16:00	**Raimondi**	16:00	**Verney**		
17:15	End	16:45	*Discussions*	16:45	*Discussions*	16:45	*Discussions*		
		17:30	End	17:30	End	17:30	End		
		19:30	Workshop dinner						