

## Quantitative Challenges in Short-Range Correlations in nuclei

30<sup>th</sup> January - 3<sup>rd</sup> February 2023

Program on the ESNT site <https://esnt.cea.fr/Phocea/Page/index.php?id=112>

**Organizers:** T. Aumann (TU Darmstadt, GSI), S. Typel (TUD, GSI), A. Corsi (CEA DPhN, contact), Or Hen (MIT), J. Kahlbow (Tel Aviv Univ., MIT), E. Piasezky (Tel Aviv Univ).

The main **goals of the workshop** are:

1. To review the recent experimental results on SRC and EMC effect from Jefferson Lab, Dubna and GSI using different experimental probes,
2. To present the different theoretical approaches in the description of SRC in nuclear structure calculations (contact formalism, quasi-deuteron approach, ab-initio approaches),
3. To survey appropriate methods of reaction theory, with specific focus on hadron induced reactions,
4. To isolate the most relevant observables that should be measured / calculated,
5. To discuss the roadmap for future experimental and theoretical developments.

### List of talks (Update of the program 27<sup>th</sup> January)

#### Monday 30<sup>th</sup> EM PROBES

- (TBA), **Lecture on EM probes, Electron scattering as probe for SRC experiments**
- Nir Barnea (Hebrew University, Jerusalem), **Theoretical interpretation of SRC**
- Douglas Higinbotham (Jefferson Lab), **SRC results from inclusive electron scattering**
- Werner Boeglin (Florida State Univ.), **Absolute cross-section measurement of  $d(e,e'p)$  reaction**
- Misak Sargsian (Florida State Univ.), **Deuteron at extremely large missing momenta**  
**Topical Discussion**
- Ubirajara van Kolck (Univ. of Arizona and IJCLab), **Introduction to nuclear effective field theories**
- Andrew Denniston (Massachusetts Institute of Technology, MIT), **The RG-M\* experiment at JLab and test of SRC universality**  
(\* Interpretation of SRC within the Renormalization Group Theory)
- Lorenzo Andreoli (Washington Univ. in St Louis), **Cross-section calculations using QMC and the short-time approximation**
- Mark Strikman (Penn State Univ.), **Probing SRC universality**

#### Discussion - SRC observability and NN interaction

#### Tuesday 31<sup>st</sup> HADRONIC PROBES

- Stefan Typel (TUD & GSI, Darmstadt), **Quasi-free scattering reaction theory (lecture)**
- Valerii Panin (GSI), **Nuclear structure studies using  $(p,2p)$  reactions**
- Julian Kahlbow (MIT; Cambridge, MA, & Tel Aviv University), **SRC studies in inverse kinematics**
- Göran Johansson (Tel Aviv Univ.), **Status update of the JINR experiment**
- Anna Corsi (CEA Saclay), **SRC experiment with unstable beams at GSI-FAIR**

#### Tuesday 31<sup>st</sup> EM PROBES

- Carlos Yero (Old Dominion Univ.), **The "CaFe" experiment at JLab**
- Willem Dickhoff (Washington Univ. in St Louis), **Comparison of  $(e,e'p)$  and  $(p,2p)$  reactions: similarities and differences**
- Fatima Hojeij (IJCLab), **Preliminary study of Short-Range Correlations in  $\pi^- + {}^{12}\text{C}$  reaction @0.69 GeV/c with HADES**
- Richard Furnstahl (Ohio State Univ.), **SRC physics at low renormalization group resolution**

#### Discussion - SRC universality in light of reaction mechanism and nuclear structure

**Wed. 1<sup>st</sup> Feb.**

### **PERSPECTIVES**

- Ehoud Pazy (NRCN), *The orbital entanglement entropy of SRCs*
- Ronan Weiss (Los Alamos Nat. Laboratory), *Applications of the GCF and the study of 3N SRC*
- Saar Beck (Hebrew University, Jerusalem), *Theoretical investigation of 3N SRC*
- Andrew Denniston (MIT), *Search for 3N SRC at CLAS12*
- Misak Sargsian (Florida St.Univ.), *3N SRCs, irreducible 3N forces and their implication on neutron star EoS*

### **HADRONIC PROBES**

- Marina Petri (Univ of York), *The (p,pd) experiment at GSI-FAIR*
- Stefano Burrello (LNS-INFN, Catania), *Quasi-deuteron model to effectively embed SRCs in relativistic mean field approaches*
- Jean-Christophe David (CEA Saclay), *SRC and final state interaction within INCL*

### **PERSPECTIVES**

- Ingo Tews (Los Alamos Nat. Lab.), *Neutron stars, the EoS from chiral EFT, and astrophysical constraints*

### **Discussion - 3N SRCs**

**Thu. 2<sup>nd</sup>**

#### **Photonuclear probes**

- Jackson Pybus (Massachusetts Institute of Technology), *Probing SRCs at GlueX*

### **PERSPECTIVES**

- Florian Hauenstein (JLab), *SRC studies at the EIC*
- Tom Aumann (TU Darmstadt and GSI), *Future of GSI-FAIR and SRC experiments*
- Douglas Higinbotham et al. (Jefferson Lab), *Future SRC studies at JLab*
- Jackson Pybus (MIT), *Nuclear physics studies at GlueX*

### **Discussion - Future directions**

**Fri. 3<sup>rd</sup> Talks on EMC effect and general Lab seminar**

- Mark Strikman (Penn State Univ.), *SRC-EMC theory relation*
- Florian Hauenstein (JLab), *Nucleon structure studies at the future EIC*
  
- Eli Piasetzky (Tel Aviv University), *Short range correlations in nuclei (general seminar)*
  
- Florian Hauenstein (Jefferson Lab), *Bound proton structure from neutron-tagged DIS*
- Stéphane Platchkov (CEA), *SIDIS and Drell-Yan measurements connected to EMC effect*
- Erez Cohen (NRCN), *SIDIS study at CLAS12*
- Raphaël Dupré (IJCLab), *Tagged DIS experiments - current and future*

### **Discussion - Bound nucleon structure**

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<https://esnt.cea.fr> 30<sup>th</sup> Jan.-3<sup>rd</sup> Feb. 2023

**Galilée room b.713**

EM PROBES // HADRONIC PROBES // PERSPECTIVES // EMC effects

Monday 30 <sup>th</sup>	Tuesday 31 <sup>st</sup>	Wednesday 1 <sup>st</sup>	Thursday 2 <sup>nd</sup>	Friday 3 <sup>rd</sup>
<b>B.713 9-9h30 Welcome</b>	9h30-10h30 <b>Lecture S. Typel</b>	9h30-10h <b>E. Pazy</b>	9h30-10h15 <b>J. Pybus</b>	9h30-10h <b>M. Strikman</b>
9h30-10h30 <b>Lecture O. Hen</b>		10h-10h30 <b>R. Weiss</b>	10h15-10h45 <b>F. Hauenstein</b>	10h-10h30 <b>TBA</b>
10h30-11h <b>N. Barnea</b>	10h30-11h <b>V. Panin</b>	10h30-11h <b>S. Beck</b>	10h45-11h15 <b>T. Aumann</b>	10h30-11h <i>break</i>
11h-11h30 <i>break</i>	11h-11h30 <i>break</i>	11h-11h30 <i>break</i>	11h15-11h45 <i>break</i>	
11h30-12h <b>D.Higinbotham</b>	11h30-12h <b>J. Kahlbow</b>	11h30-12h <b>A. Denniston</b>	11h45-12h15 <b>D.Higinbotham et al.</b>	11h-12h <b>DPHn-ESNT Seminar</b>  <b>E. Piassetzky</b>  <b>SRC correlations in nuclei</b>
12h-12h30 <b>W. Boeglin</b>	12h-12h30 <b>G. Johansson</b>	12h-12h30 <b>M. Sargsian</b>	12h15-12h30 <b>J. Pybus</b>	
12h30-12h45 <b>M. Sargsian</b>	12h30-13h <b>Discussion</b>	12h30-13h <b>Discussion</b>	<b>Discussion Future directions</b>	
12h45-13h15 <b>Discussion</b>				
13h15 <i>lunch</i>	13h <i>lunch</i>	13h <i>lunch</i>	13h <i>lunch</i>	12h <i>lunch</i>
14h45-15h15 <b>U. van Kolck</b>	14h30-15h <b>A. Corsi</b>	14h30-15h <b>M. Petri</b>		13h30-14h <b>F. Hauenstein</b>
15h15-16h <b>A. Denniston</b>	15h-15h30 <b>C. Yero</b>	15h-15h30 <b>S. Burrello</b>		14h-14h30 <b>E. Cohen</b>
16h-16h30 <b>L. Andreoli</b>	15h30-16h <b>W. Dickhoff</b>	15h30-16h <b>J.C. David</b>		14h30-15h <b>S. Platchkov</b>
16h30 <i>break</i>	16h <i>break</i>	16h <i>break</i>		15h-15h30 <b>R. Dupré</b>
17h-17h30 <b>M. Strikman</b>	16h30-16h45 <b>F. Hojeij</b>	16h30-17h <b>I. Tews</b>		15h30-16h <b>Discussion</b>
17h30-18h <b>Discussion</b>	16h45-17h15 <b>R. Furnstahl</b>	17h-17h30 <b>Discussion</b>		
	17h15-17h45 <b>Discussion</b>			<b>16h END</b>