

THE PHYSICS CASE OF THE WEAK CHARGE OF ¹²C

SCIENTIFIC PROGRAM ON HOW TO MEASURE, COMPUTE AND INTERPRET THE POLARIZED CROSS SECTION ASYMMETRY IN FIXED-TARGET ELECTRON-CARBON ELASTIC SCATTERING

IF-UNAM, March 18 – April 5, 2019





German Research Foundation

WHY ARE WE HERE?

- shine light & contextualize the weak charge of ¹²C
- identify open problems
- initiate new collaborations
- explore the city and enjoy the culture and the food



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- SLAC @ Linac and SLC: E122 (q) and E158 (e)
- JLab @ 6 GeV CEBAF: PDVIS (q), QWEAK (p)
- JGU Mainz @ MESA: P2 (q and ¹²C)
- JLab @ 12 GeV CEBAF: MOLLER (e), SoLID (q)
- APV: single (heavy) isotopes and *isotope chains*
- v scattering: DIS and <u>coherent</u>





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SOME CONTEXT

- weak mixing angle $sin^2\theta_W = g'^2/(g^2 + g'^2)$
- many ways to measure in SM (flavor, Q², ...)
- differences may reveal BSM physics (heavy or light Z', dim-6 operators)



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SM CALCULATIONS

- need full 1-loop QED under experiment-specific conditions; higher orders?
- box diagrams (Mikhail Gorshteyn, Chien Yeah Seng)
- 2-loop electroweak



- running mixing angle (Rodolfo Ferro)
- neutron distribution (Jorge Piekarewicz, Oleksandr Koshchii)



WORKING GROUPS

- WG 1: SM calculations
- WG 2: interpretation and global context
- WG 3: m_b

[2 g^{eu} - g^{ed}]_{AV}



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STRUCTURE OF SCIENTIFIC PROGRAM

- Week 1: Jorge Piekarewicz (PP Seminar)
 - Martin Camalich (Colloquium)
- Week 2: Pere Masjuan (heavy quark sum rules)
 - Hubert Spiesberger (Sandoval Vallarta Theory Seminar, TBC)
- Week 3: Workshop program
 - Frank Maas (Colloquium)
 - Krishna Kumer (Sandoval Vallarta Theory Seminar)
- Excursion 1: the swimming gardens of Xochimilco (this Sunday)
- Excursion 2: the pyramids of Teotihuacan (this Saturday or Sunday, March 31)





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