Simulation Status

- Signal simulation was working quite fine;

- few samples of ER and NR were sent to IDAO as possible exercise for the Olympiad

- Few things needed to be tuned:

  - **W value**: number of electrons produced per keV released in gas. From Garfield we got 1e-/42 eV for relativistic particles. Is it valid also at low energies? And for NR? André is looking at this issue;

  - **QF**: Flaminia and André developed a method to evaluate it and properly take into account how it changes along the track. Needed to be checked;

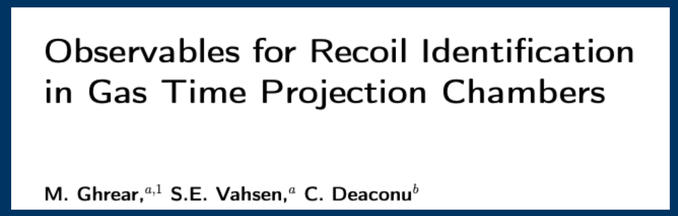
  - **Saturation**: I'm trying to reproduce the effects and the behavior of the gain non linearity. It seems possible to reproduce the trends, but parameters have to be fixed for absolute values. Not only the total light but also the spot shapes seems to be affected (because the core is suppressed more than periphery) and diffusion effect is overestimated.

  - **AmBe**: Andrea and Stefano wanted to simulate AmBe interactions. This would be necessary for the Migdal study and for general comparison.

  - **AOB**

Simulation Status

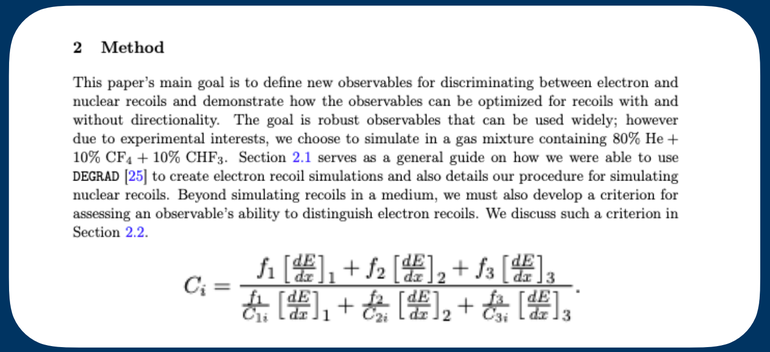
- A paper was published on arxiv by Sven et al about their simulation work:
- https://arxiv.org/pdf/2012.13649.pdf



Observables for Recoil Identification in Gas Time Projection Chambers

M. Ghrear,[a,1] S.E. Vahsen,[a] C. Deaconu[b]

- A section is dedicated to describe the simulation method based on: Garfield, SRIM, RETRIM and DEGRAD



2 Method

This paper's main goal is to define new observables for discriminating between electron and nuclear recoils and demonstrate how the observables can be optimized for recoils with and without directionality. The goal is robust observables that can be used widely; however due to experimental interests, we choose to simulate in a gas mixture containing 80% He + 10% CF_4 + 10% CHF_3. Section 2.1 serves as a general guide on how we were able to use DEGRAD [25] to create electron recoil simulations and also details our procedure for simulating nuclear recoils. Beyond simulating recoils in a medium, we must also develop a criterion for assessing an observable's ability to distinguish electron recoils. We discuss such a criterion in Section 2.2.

$$C_i = \frac{f_1 \left[\frac{dE}{dx}\right]_1 + f_2 \left[\frac{dE}{dx}\right]_2 + f_3 \left[\frac{dE}{dx}\right]_3}{\frac{f_1}{C_{1i}} \left[\frac{dE}{dx}\right]_1 + \frac{f_2}{C_{2i}} \left[\frac{dE}{dx}\right]_2 + \frac{f_3}{C_{3i}} \left[\frac{dE}{dx}\right]_3}.$$

- We should read it, understand what they did and probably arrange a meeting to ask clarification and any tools they want to share with us
- Once the last points are addressed I think we should prepare a paper on signal simulation with some comparison with experimental data