



Proposal for Organization of WG4

Detector Physics Modelling and Simulation

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Premises

- Gaseous Detectors are a large community
 - Even when looking only at people / groups dedicating (part) of their time to physics modelling & simulation
 - E.g. Survey response: 89 responses, some for their group (*and not including WG conveners*)
- Reasons one comes to WG4 can be to ...
 - work on his/her own interest, but let the community profit / benefit from the work they do by sharing code / sharing experience / good practice / ...
 - search for collaborators to take on larger tasks
 - Learn from other groups how to start simulations or to learn limitations of the current state-of-the-art
 - ... [*add your motivation here*]

In WG4 ...

- We will not do the work for you ...
instead we would like develop a fertile ground for simulation work
- We will host and help groups / individuals coming from the various work-packages to:
 - Help/guide to develop the code they need for their WP
 - Validate data
 - Understand data => model => simulate to confirm model
- Help / host groups / individuals willing to push boundaries of simulation further
- Help groups working effectively together

Through ...

- We believe this is best done in smaller groups that share the same interest and where there is time to know each other and look for synergies to work together
- Therefore we propose the creation of “Task Force” or “Topical Groups” dedicated to the different areas
 - Have several suggestions, we will try to ignite all, but we will see how many will become *active* and “*self-sustaining*”
 - Work will be done if people are interested to free their time to work on it ... we will help by providing aid and constructive atmosphere
- Organization of WG4 working meetings:
 - Can have a common part (general interest) and a topical part
 - Invite WP leaders to present simulation work to be done in their WP
 - Rotation of topical parts
 - Agenda to be defined and communicated ahead
 - Each topical group will meet 2-3-4 / year
 - Can become more if activity ramps up (bottom-up approach)

Suggestions for “Topical Groups”

1. Communication & Documentation

- Develop website, develop documentation, Prepare examples (and publis), simulation school
- Translate C++ to python, SWAN / Collab notebooks

2. Space Charge & Large Avalanches

- New – hybrid – algorithms: cpu & memory efficient
- Electric field update for large space-charge, Investigate use of GPU

3. Resistive Detectors

- Signal induction in detectors with resistive layers
- Simulate / model large-size effects (distance to GND)
- Transmission line / signal transmission over large distances

4. Ecological / New gases (incl x-sections, Py- / Beta- / Magboltz / Methes ...)

5. Measurements and modelling of non-equilibrium and low-pressure effects

- Measurement and extraction of Penning effect, feedback, ion mobilities , ion-clusters

6. Software Integration & Development

- Core software development, Software maintenance, Software optimization (reduce mem)
- Parallelization, use of heterogeneous computing (gpu), pioneer machine-learning?
- Integration of different sw to work smoother together, ...

7. Rare-event TPC simulations

- Development of electro luminescence, Negative ions,

8. Wire Detectors (discussing Data/MC comparisons, outstanding issues, ...)

How?

- Working together on the same topic / towards a shared goal can help start a collaboration
- this is a "required" condition, this is not a "sufficient" condition ...
 - Personal / group collaboration depend on many human factors
 - We will not force people to work together if they cannot get along with each other
 - As WG conveners we will strive to:
 - Converge on topics / goals if we see manpower & will available
 - Avoid as much as possible work duplication / parallel groups
 - Find a place for everyone to conduct his/her research
 - Create a stimulating environment for everybody
 - Ideally we can create a situation where we can find funding together
 - Small projects between 2-3 institutes with funding for 1-2 doctoral students
- Note: we are a working group ...
 - This means ... working together and sharing information / experience
 - This is not a conference where you come, you present your work, respond to questions and return home to continue your work alone

Topical meetings ... how?

- We would like to understand from everyone to which (1+) topical groups they feel they belong to
- Topical meetings can have their own organization
 - E.g. topical meeting on communication / documentation will be different from the topical meeting on the development of new code for avalanches ...
 - But note that we will have likely an audience (participants!) with a mixed experience / background
 - Therefore an overview talk to start with that illustrates the state of the art given by one expert of the field would be desirable to have everyone on the same page
 - This can be followed by a discussion where we can agree on a work plan and on sharing of the tasks, common funding requests, shared PhD stud ...
- WG4 conveners will investigate with the different groups their availability and come up with a planning for the next 3+ months

Questions / Discussion?

- Your input here