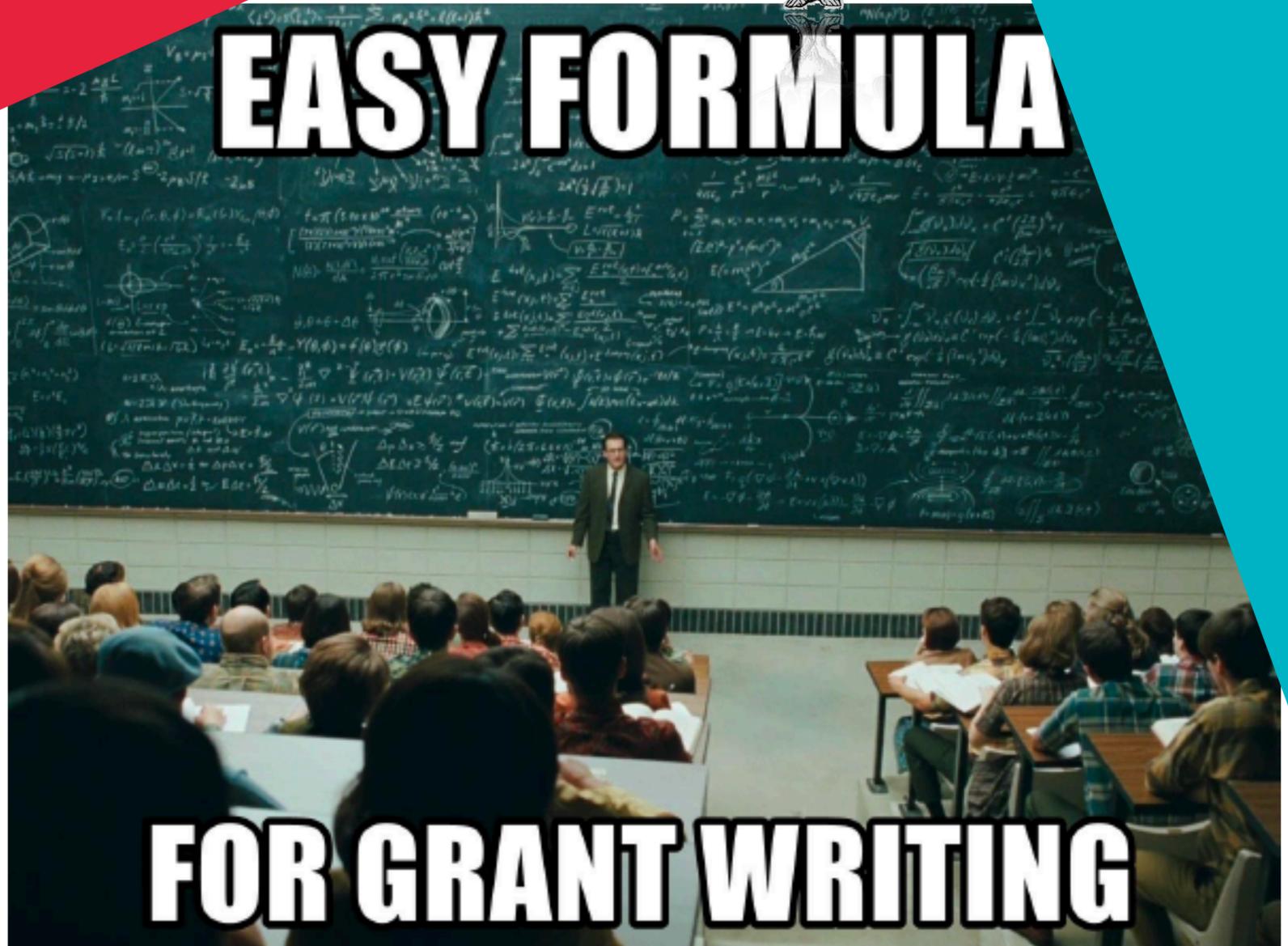


# HOW TO WRITE A GRANT



**EASY FORMULA**



**FOR GRANT WRITING**



Nik|hef

# What we ask you

- 📌 At the end of the school each group
  - 📌 Should have written a proposal:
    - ▶ Based on Green Science
    - ▶ Not longer than 1200 words and in any case no more than 3 pages figure included and biography excluded
    - ▶ You ask for 800k euros ... assume a PhD costs 240k just salary
    - ▶ Prepare 5 minutes movie pitch
- 📌 The last day we play the movie and we award the 3 best proposals

# Why green science?

- 📌 You have many different backgrounds at this school but “green science” is a common theme. Does not matter how you see that, you can pick up any aspect, computing, hardware, general running schedule, powering, efficient analyses .....

Each group has 6 persons, choosen randomly

## How to:

1. Think
2. Check relevant literature
3. You can use plots from literature, from your work or create them by combining published data from literature in a new plot
4. Write the proposal
5. Make the video

You have 1,5 hours/day, this session

# A typical grant

1. Abstract
2. Background and aim
3. Research plan
4. Knowledge utilisation

# A few tricks for the abstract

- 📌 This is not a conference or a paper so do not be too technical
- 📌 Usually your proposal is reviewed by experts + **an independent panel**
- 📌 The independent panel can contains scientists from fields light years away from yours (biologists, chemist, medical doctors ....)
- 📌 So:
  - ▶ Your statement needs to be correct but understandable from everyone with a PhD in physics or *close-by* fields
  - ▶ Avoid acronyms as much as possible
  - ▶ Read your abstract 100 times: this is the first part the committee see and you can loose your grant here

- 📌 As example if you are in particle physics and you need to write:
  - ▶ “charm quark” -> heavy quark named charm
  - ▶ Hadron -> particle
  - ▶ Avoid just writing Quantum Chromo Dynamics or worse just QCD -> The theory that governs the strong interaction among quark and gluons (QCD)
  - ▶ Do not use we. “I” is the goal, give the impression you are “the guy”

**Keep in mind:** the reviewer is a human with limited time, if he/she does not understand then you are wrong (no matter if you are not)

- 📌 With the abstract this is the most important section
- 📌 Make sure your idea is clear: you should be able to state it in 4-5 lines, all the rest would be just details. May be even highlight these 4-5 lines with a “**Aim:**” in front.
- 📌 Before or after your aim add a paragraph with some background. Your idea is surely based on some previous science that support its feasibility.
- 📌 Be careful with bibliography. Read this section 100 times and ask yourself: do I have all the needed citations? -> **reviewers know the literature and if you miss some of their favourite papers it will backfire**

# An example

## 2a1: Overall aim and key objectives

The aim of my research proposal is to study the physics of ultra-relativistic heavy-ion collisions, which offers the possibility to investigate the fundamental theory of strong interactions, especially the colour confinement, under the extreme conditions of high temperature and density. In the Standard Model, the physical theory describing the strong interactions between colour-charged objects (quark and gluons) is called the Quantum Chromodynamics (QCD). A feature of the strong interactions first proposed by D. Gross, F. Wilczek and D. Politzer, who were awarded the Nobel Prize in Physics in 2004 [1], is the asymptotic freedom. According to this phenomenon, the interaction between colour-charged objects is arbitrarily weak if they come close to each other. In contrast, the potential between the particles increases to infinity if they are separated. This is called colour confinement. However, in case the temperature exceeds a critical value [2], QCD predicts a phase transition from colourless hadronic matter (hadrons and mesons) to the so-called Quark Gluon Plasma (QGP), a deconfined system of quarks and gluons. The key objective of the proposed research is to characterize the QGP, produced in laboratory through heavy-ion collisions at Large Hadron Collider (LHC) [3] at CERN (European laboratory for subatomic physics).

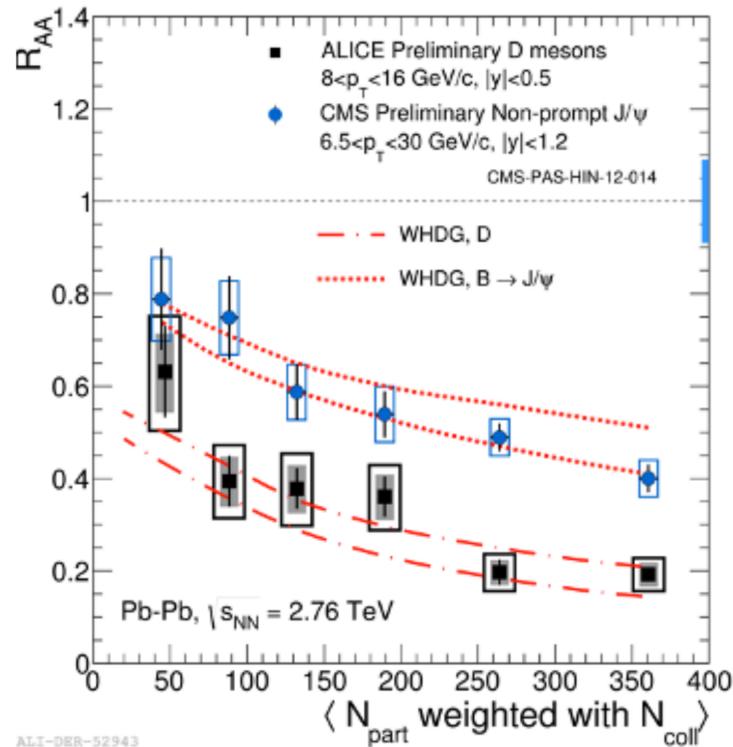
To pursuit my objective I will use heavy-flavour hadrons, namely particles held together by the strong interaction and containing heavy quarks: charm ( $c$ ) and bottom ( $b$ ). Heavy quarks are proposed as qualitatively and quantitatively excellent probes to investigate the QGP properties. Due to their large masses they are produced during the hard

This is just a part of it but it is a part of a successful one

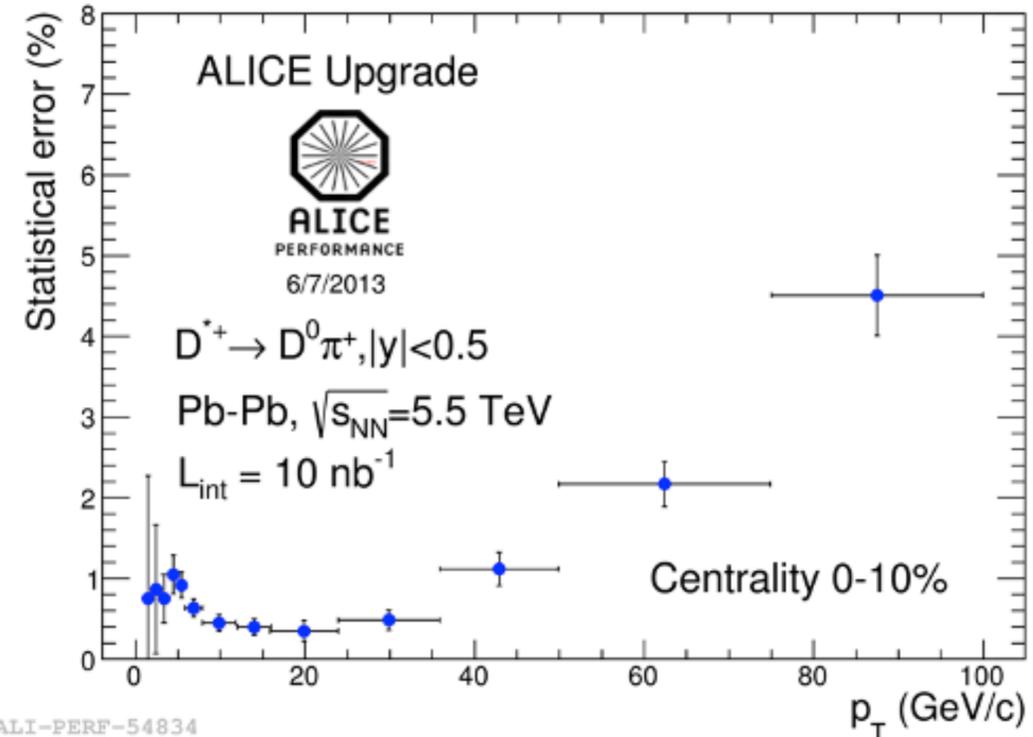
- 📌 Here you can be a bit more technical but do not exaggerate
- 📌 It needs to be short but complete
- 📌 Generally it is useful to add a structure with work-packages (WP)
- 📌 This is a good moment to add a couple of plots: catchy, self contained possibly a small simulation (pilot study) showing your idea make sense

**Note** the expert reviewer will be interested to this section, be sure even in the simplicity you maintain a rigorous approach

## Current research



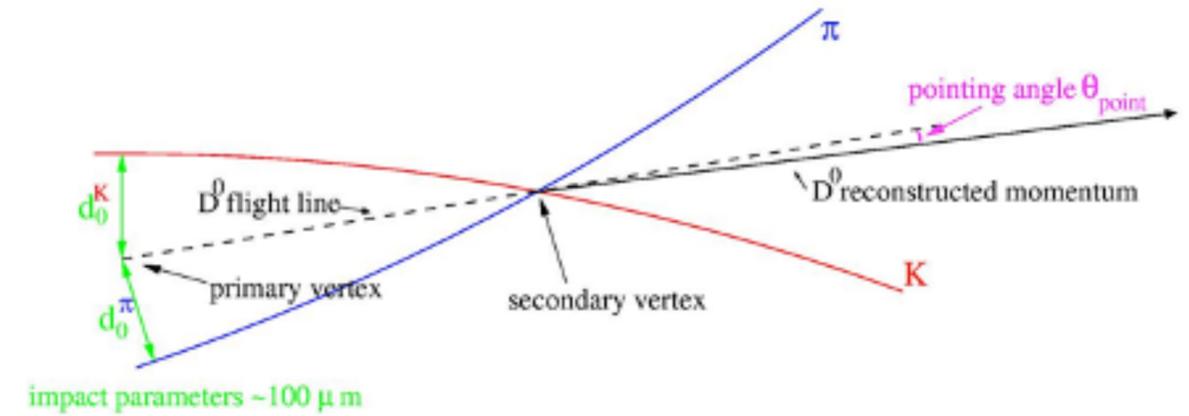
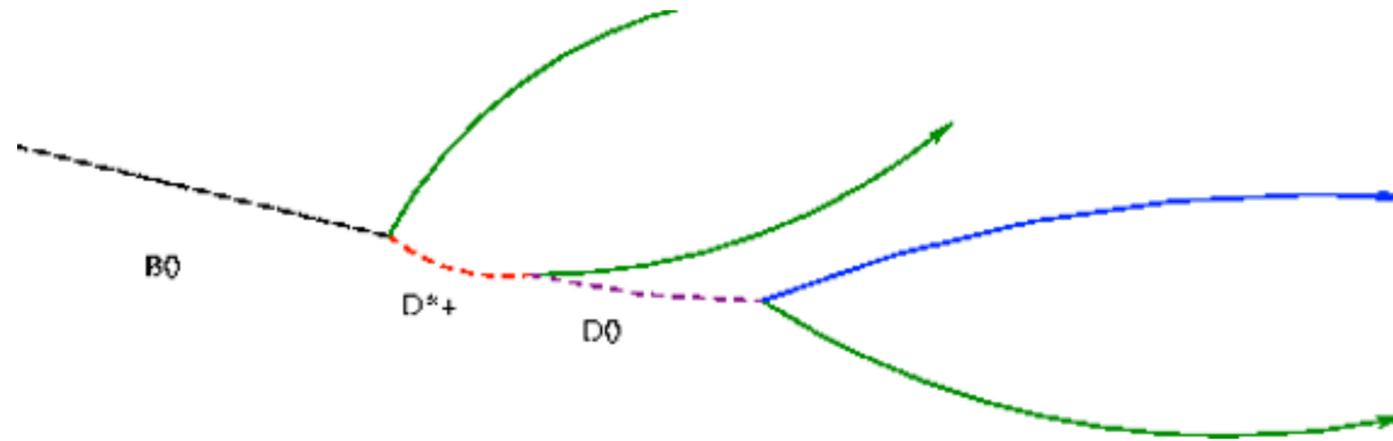
## Pilot study based on the proposal



The field is here  $\longrightarrow$  This proof I can do what I propose

Make pics easy to understand. With not too many information. Everything is in the pic should be even in the text

# Figures



Make sketches, especially if you need to explain something hard but that can be visualised. A good sketch can save you few text lines of explanations

# Your message has to be clear

- 📌 Elaborate your idea and put it down clearly. Consider:
  - ▶ A person take your paper and out of the blue in ~30 min has to think: *wow this is greath*. If this happens then:
  - ▶ An expert has to take your paper and think: *wow this is greath*

- 📌 Nowadays all the grants have this section and your first reaction will be: **what a waist of time!** .. well if you think so you are wrong
- 📌 The granting agency wants to know:
  - ▶ Who in science can profit from your research: i.e how this research will benefit your field and/or close by fields
  - ▶ How the society as a whole can benefit from this research

# A few tricks

- 📌 Nowadays all the grants have this section and your first reaction will be: what a waist of time! .. well if you think so you are wrong
- 📌 Your first reaction could be I write 4 lines just saying is great for fundamental science in my own field

All fine, if this is it you write so, but keep in mind: you compete with other great ideas and if your competitor has something to say here then he/she gets the grant

- 📌 What I like of knowledge utilisation is that it force you to think not exactly to your research but on how this can be useful in general
- 📌 May be is not directly applicable to other fields but as example what about outreach?

As a working example: Do you use machine learning in your grant? .. then you can think to generalise the algorithm, create a proper web-tool to teach high-school students machine learning and data analysis

- 📌 Your project and idea is surely excellent and you will deliver what you promise but:
  - 📌 Not all depends from you (data, hardware, ....). What in case of delays?
  - 📌 Is your method super secure? If not do you have a plan B?

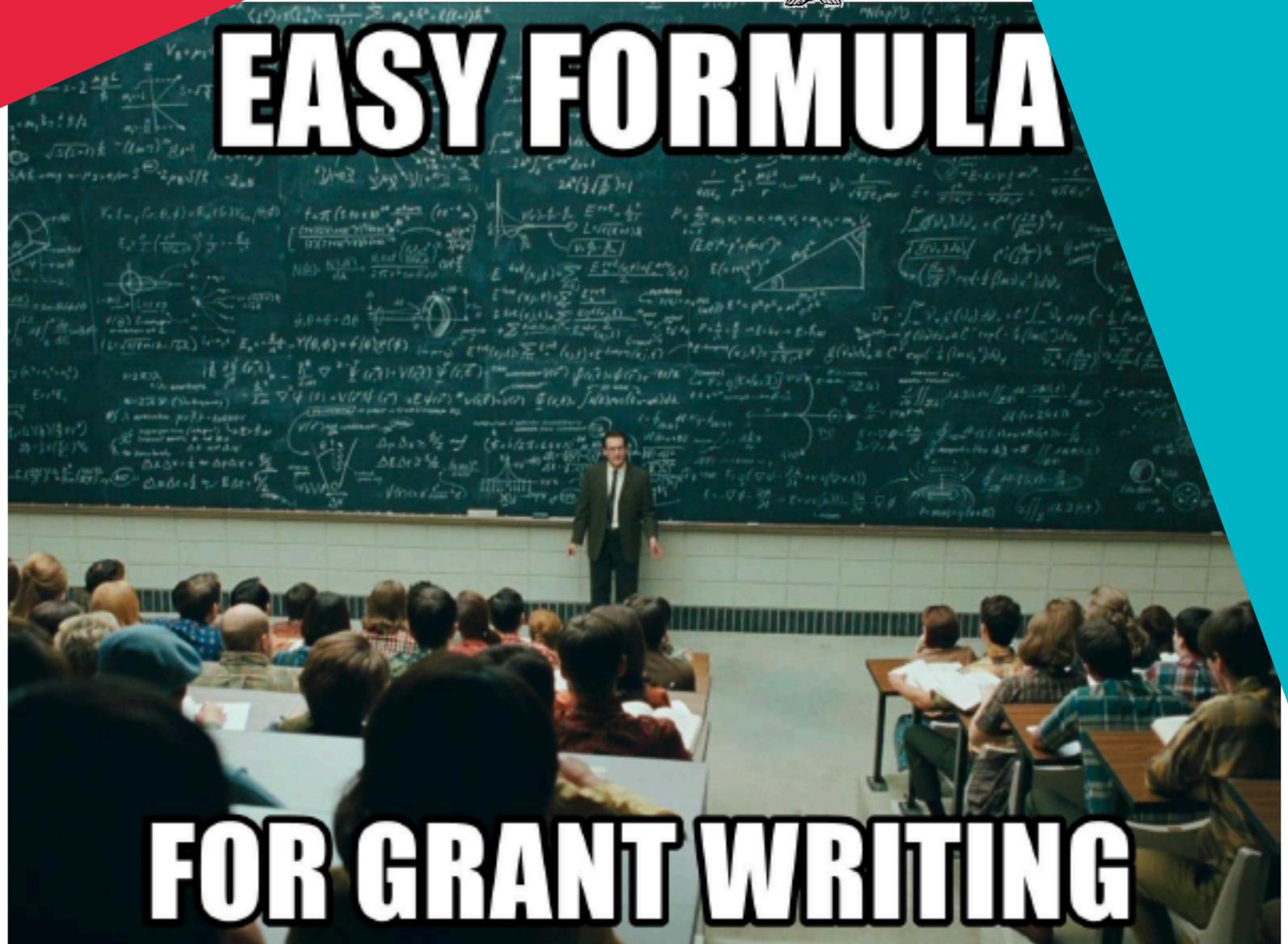
Do not overdue, write a small section

# What if I do not win a grant

- 📌 World does not end at the first grant. Do not worry, in general for a competitive grant you might have 20% or less chances to win. Just learn from your mistakes. Take very much into account the referee report and the final assessment, improve, resubmit



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