

Report of the physics team on cosmic inflation

in the Research Training Group *Particle Physics Beyond the Standard Model*

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December 15, 2014

Team profile

This physics team is composed of two PhD students working in theoretical physics and two PhD students working on experimental high energy physics. Johann Brehmer is working on LHC physics and new particles in the group of Prof. Plehn, Frank König's research field is cosmology in the group of Prof. Amendola, and Michael Kolpin and Marian Stahl both work on the LHCb experiment in the groups of Prof. Uwer and Prof. Hansmann-Menzemer respectively.

Formation and planning

The team was set up after potential topics were proposed by the students and a poll where students chose their preferred topics.

The next steps were discussed within the team by e-mail exchange and a meeting was organized July, 17th to discuss the planning, previous knowledge of the topic and the literature. In the meeting the team agreed to focus on reading [1] in order to become familiar with the topic and to be able to have a profound basis to discuss the topic in the next meeting.

Physics team meetings

Due to various time constraints such as summer schools, trips to CERN and summer holidays only two more meetings were held. After an informal, yet fruitful discussion on the topic of cosmic inflation, the team decided to split the topic in specific subtopics matching the physics background of every team member. The subtopics were elaborated individually, presented and discussed in a subsequent meeting. Johann Brehmer worked on Higgs inflation, Frank König on alternatives to inflationary models and Michael Kolpin and Marian Stahl worked on experiments and observables suited to probe cosmic inflation.

Review

The team profited from the balance between theoretical and experimental backgrounds that allowed for prosperous discussions and exchange of ideas and knowledge. The topic was more or less entirely new to Johann Brehmer, Michael Kolpin and Marian Stahl who already learned a lot during the introductory reading of the literature and the discussions with Frank König who shared his prior knowledge. In the course of the discussions on the subtopics new insights were exchanged which helped to deepen the knowledge about the topic.

On the other hand the topic itself lacked of "hands-on" physics and was concentrated only on literature. The work on the topic itself was mainly carried out individually and lacked due to mentioned time constraints of real teamwork. At the end, the team had the impression to have only scratched the surface of this vast topic and that there are many directions to go deeper into cosmic inflation and its related subjects.

In order to improve on the project, the team and/or the organizers should have thought about specific aims or "hands-on" projects. The teamwork aspect should have been increased by more regular meetings. The report is summarized in figure 1.

References

- [1] D. Baumann, *TASI Lectures on Inflation*, [arXiv:0907.5424v2 \[hep-th\]](https://arxiv.org/abs/0907.5424v2), (2012)

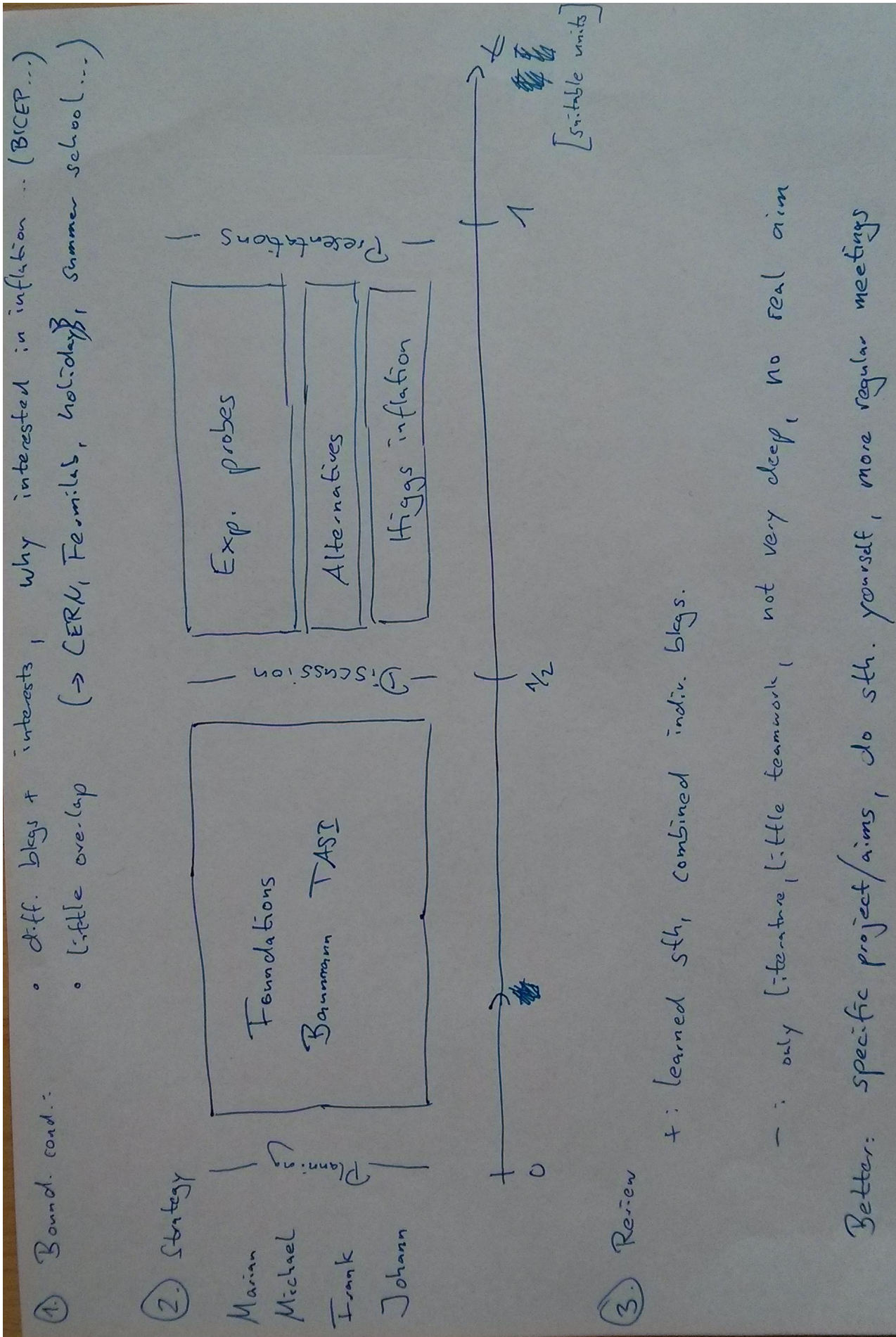


Figure 1: Summary diagram of the project