

Referee Report on GEMMA-III by H. Gutbrod:

To 1 a: Goals of the experiment

The goals are well described and are of great importance. The search for the Magnetic Moment of Neutrino (MMN) and Coherent Elastic Neutrino-Nucleus Scattering (CEvNS)

Since the detector is in the commissioning phase, data are expected in 2019. Earlier data with GEMMA-I have set world best upper limits for MMN.

The group aims at increasing the detector volume once it has a good understanding of the present 5.5 kg detector mass composed of 4 HPGe Detectors. ***One may argue in view of the long running time, that the group should find funding to go for a 10-fold increase of the detector mass. I know that this is very expensive but it would improve the data substantially, allowing various settings at reduced running time.***

To 1 b: International scenario.

In the international context, GEMMA-III has advantage in the positioning very close below a high flux reactor KNPP.

The group seems to be well imbedded in the international community, especially important for low radioactive materials and detector tests.

With the HPGe detectors it is at the forefront of sensitivity.

Going for a suggested 10-fold increase in detection mass would be easier if the group would invite international partners.

To 2 a: Contribution of the JINR Group, its responsibilities

The JINR group has full leadership and responsibility. Hardware, software and analysis are done by JINR. Custom-made low threshold HPGe detectors and cryostats are produced in cooperation with Canberra Company and with LSM, France.

To 2 b; Group structure and responsibilities

Project leader is V.B. Brudanin (head of department), with 20% of his time. There are in total 15 persons in the group, however expressed in FTE it is only 7.2 FTEs. In detail: 2.5 engineers, 4.7 Scientific Staff. ***In my opinion, the group should have more full time scientists when going to the larger set-up.***

To 3: Plans

Primary goals are to enter data taking state and to perform precision measurements of CEvNS and searches for MMN. ***Statement that long stable data taking is required for these goals is not quantitative enough. Is that few months, several years or? This should be evaluated, in order to see if goals could be reached.***

To 4: Publications

No publication in 2016, 2017, 2018

To 5; PhD theses:

Two theses in preparation with expected completion in 2019

To 6 a; Invited talks:

One in 2017 in Eric, Italy

To 6 b; Parallel Talks:

5 talks in Russia

To 7a: Group size, composition

There are in total 15 persons in the group, however expressed in FTE it is only 7.2 FTEs. In detail: 2.5 engineers, 4.7 Scientific Staff.

Members of the group participate also in other related experiments like DANSS, which is a needed symbiosis due to reactor access regulations. The possibility of remote control of the experiment I assume has been studied.

In my opinion, the group should have more full time scientists when going to the larger set-up and full-responsibility on young shoulders.

To 7b: Expected changes in group size

No changes expected

To 7c: JINR Group Budget from 2018 until the end of the currently approved project in a Table specifying the main budget items (equipment, computing, salaries, common funds, travel...)

The budget looks reasonable, but could be more ambitious for the potential in physics. The possibility of remote control of the experiment I assume has been studied.

The list does not contain the salaries or premiums.

Summary:

The project is very promising and should be pursued with vigor. I would like to see more precise time estimates for achieving the physics goals, at least once first data come in. Presently it looks like one of several experiments of this team what can be understood being due to the development of the detectors. Hope is that a dedicated core of scientists will run this project in the operation phase.