March 17 2010

Dear Ministers of Science and staff,

Dear members of the CERN Council!

We regard it as our duty to inform you about the current state of the scientific discussion - including very recent developments you may not be aware of - concerning the risks and dangers of the LHC particle collider.

Please consider the studies we describe below. Due to the global risks being considered, due to the fact that there has been no neutral and multidisciplinary evaluation of the risks and due to the fact that there is no international standardized procedure or agency to evaluate these risks, critics of the planned experiments urgently recommend that they not be conducted at unprecedented energies until these deficiencies are remedied.

There are at least four possible types of existential risks associated with the LHC: microscopic black holes, strangelets, magnetic monopoles, and expanding vacuum bubbles. We respectfully request you to speak for a re-evaluation of these risks at the CERN Council meeting this week and to ensure that they are responsibly managed in best practice, which is - under a number of perspectives - presently not the case.

Frequently the LHC collisions are compared to natural events in the atmosphere. But this comparison, known as the “cosmic ray argument”, contains many fundamental weaknesses and uncertainties. To start with only the most basic problems in it: The nature, mass, velocity and origin of highly energetic cosmic rays are presently unknown. Only their energy is measured indirectly. Within 10 years of operation, the LHC experiments would produce as many high-energy collisions as occur over the whole Earth in roughly 100,000 years. This also assumes that the comparison of natural and artificially-created collisions, as argued for example in the LSAG safety report, is possible, which is questionable. Far from copying nature, the LHC focuses on rare and extreme events in a physical setup which has never occurred before in the history of the planet. Nature does not set up LHC experiments.

Significantly, after a recent communication to the United Nations High Commission for Human Rights, the Commission responded: "we appreciate the importance of the issues at stake" and pointed to domestic administrations for consideration. This approach to you is consistent with this recommendation.

Risk assessment expert and ethicist Dr. Mark Leggett concludes in a recent study that the CERN (LSAG) safety report is "out of date", "has a conflict of interest", and satisfies less than a fifth of the criteria for an adequate risk assessment. Chaos theory pioneer Professor Otto E. Rössler estimates the risk of a black hole disaster at 15% if the experiment continues as planned. Astrophysicist Dr. Rainer Plaga warns that a collider-created black hole accreting at the Eddington limit would emit energy at the rate of a 12 megaton bomb every second. Well-known physicist Dr. Tony Rothman calls for the creation of a permanent mechanism to deal with new scientific and technological concerns. Leading risk researcher Professor Wolfgang Kromp supports a special environmental impact assessment of the LHC. The famous "thinker of speed", philosopher Professor Paul Virilio strongly criticizes the experiment. Philosopher Dr. Toby Ord, philosopher and physicist Professor Rafaela Hillerbrand and risk researcher Dr. Anders Sandberg of Oxford's Future of Humanity Institute note that the extremely low risk estimates offered by collider advocates ignore the statistical probability that the assumptions on which the safety arguments given by CERN are based could fail and they conclude that the LSAG safety report cannot be the last word in the issue. Professor Eric Johnson reports in a study recently published in the "Tennessee Law Review" and summarized in the "New Scientist" that whether the LHC is safe or not is an open scientific question and that most arguments in favour of its safety lack robustness:

http://www.newscientist.com/article/mg20527485.700-cern-on-trial-could-a-lawsuit-shut-the-lhc-down.html

Until now, no court has taken any relevant action to improve safety in this complex matter. However, the need for an open and inclusive approach to this issue was highlighted by American federal Judge Helen Gillmor who emphasized: "This extremely complex debate is of concern to more than just the physicists."

In addition, the unexpected results of the first LHC runs last December have raised a host of new questions that should be answered. Results indicate an excess of strange-kaons beyond what models have predicted, suggesting an increased risk of strangelet production. These questions should be resolved before increasing energies by a factor of three.

We have attached some of the key studies on this issue, by authors who have a track record of publication in mainstream high-impact peer-reviewed journals:

Dr. Mark Leggett: "Review of the risk assessment process used for the 2008 LHC safety study"

Dr. Toby Ord, Prof. Rafaela Hillerbrand and Dr. Anders Sandberg: "Probing the Improbable: Methodological Challenges for Risks with Low Probabilities and High Stakes"

Professor Eric Johnson: "The Black Hole Case: The Injunction Against the End of the World"

These studies include, in particular, assessments from experts in the fields markedly missing from the physicist-only LSAG report - those of risk assessment, law, and ethics and statistics. Further weight is added because the experts are all university-level experts – from Griffith University, the University of North Dakota, and Oxford University respectively. It is therefore of great significance that none of these independent experts support the design or the results of the LSAG report. All state that there are gaps in the LSAG risk evaluation. The independence and similarity in result of these analyses means they are three major red flags about the LSAG report. Positively, however, they all recommend pathways to fill the gaps.

Given the source and authoritativeness of this material, we are confident you will therefore consider it, and include the results of those considerations in your forthcoming decisions concerning the LHC.

In a concrete physical concern, it is important to emphasize:

Dr. Rainer Plaga: "On the potential catastrophic risk from metastable quantum-black holes produced at particle colliders"

Recently, a new study, "Black Hole Production at the LHC: A Review of the Risks", has been prepared. It reviews the present arguments in the LSAG report for the safety of microscopic black hole production and concludes:

"Overall Assessment

The beginning of this section summarized the present uncertainties about whether black holes are stable or radiate, how fast they might radiate, and whether they might be charged or must all be neutral. Given these uncertainties, a reasonably cautious approach would be to avoid black hole production if even one of these cases carries an unacceptable risk. The above review has shown, however, that almost all of these cases pose unacceptable risks to the planet. In such a situation, there can be little doubt that black hole production at the LHC would be an unacceptable and irresponsible risk."

The latest draft of this study is available on request.

It is important to mention that in addition to the risks associated with black holes, many critics of the LHC experiments consider the possibility of dangerous strangelet production to be even more underestimated. Strangelets could conceivably convert matter or even the entire planet into a dense ball of strange matter. A research programme to more carefully study this risk was recommended in CERN's first safety report but not completed for the LSAG report.

It is also important to note that the only organizations which have publicly endorsed the LSAG report are physics organizations. No support has been received from any risk assessment organization, any ethical or philosophical organization, or any citizens' organization.

We trust that you will carefully review these documents and reconsider the potential risks of the LHC.

We note the advice of the well-known writer Kevin Hassett:

"Worldwide Void

Right now, the world's governments have no mechanism to coordinate rational thinking about these risks.

[...]

It is urgent that a panel be assembled to explore policy in the presence of catastrophic scientific risks. The alternative is to continue to bet the future of our planet on a process that keeps producing safety assurances that are subsequently refuted."

Despite these safety concerns, CERN plans to begin 7 TeV collisions (3.5 TeV per beam) by March 30 -- an energy about three times the present record – apparently without steps in between and without carefully analyzing the results after each increase in energy.

We beg you to consider the attached papers and the debate on LHC risks, to speak for a neutral and multidisciplinary evaluation of the risks at the CERN Council meeting this week, to establish a neutral and multidisciplinary board for a proper risk assessment, and to conduct further astrophysical studies (AUGER, AMS 2 and similar projects) before any operation of the LHC at unprecedented energies. Then, big jumps in energy levels should generally be avoided.

Summary:

- Several severe risks presently cannot be excluded.
- A safe start-up of the LHC would need a neutral and multidisciplinary risk assessment.
- To verify central safety arguments ('cosmic ray argument') further theoretical analyses and further empirical astrophysical experiments (Earth-based and in the atmosphere) are needed.
- Then, a start-up in small steps, with careful analyses of the previous results before each increase of energy, could – to some extent - reduce the risks.
- A constructive dialogue between critics, science ministries and CERN could have positive effects on the safety of high energy experiments at particle accelerators.
- Finally, an international, neutral and multidisciplinary agency to objectively assess the risks of high-energy experiments could improve safety in this unregulated field, which presently still lacks standardised procedures to evaluate the risks.

We want to remind you that the final responsibility for the safety of the LHC is held by the CERN member states.

Yours sincerely,

expecting your answer:

The authors of this request, in the name of many others:

[International Signatories]

[Newsblog at LHC Kritik:

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