



Prof. Laura Covi, Ph. D.

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Ref.: **Reference letter for Christian Gross**

Dear Colleague,

I am writing in support of Christian Gross, who is applying for a Post-Doc position at Your Institution.

Christian was a doctoral student at Hamburg University under the joint supervision of Jan Louis and myself, joining us in November 2006 from Heidelberg to work on a project on inflation and scalar fields in supergravity and string theory. At the time we had just hired Gonzalo Palma as a post-doc on the same project and the two of them started off immediately with a very fruitful collaboration. Jan and I were always present during weekly discussions, gave suggestions and checked part of their results, but the main work on the project was done by Gonzalo and Christian. At the beginning Gonzalo, with more experience and knowledge, was the leading collaborator, but slowly Christian learned from him and caught up. After Gonzalo left DESY, I had many more occasion to discuss with Christian alone and I have come to appreciate his insights and value him as a very good researcher on his own.

Our work lead to three publications. In the first paper we considered general de Sitter metastable vacua in no-scale supergravity and derived general conditions on the Kähler potential that allow for those vacua; moreover we analysed in detail the case of two moduli both in heterotic and type IIB compactifications. In the second publications we discussed instead the consequences for inflation and formulated a new version of the η problem, similar to the metastability condition for general de Sitter. In a third publication we gave explicit examples of metastable de Sitter solution in the case of two fields. These publications have many authors since, during a visit of Claudio Scrucca at DESY, we discovered that he and Marta Gomez-Reino were working along very similar lines and decided then to join forces. This has lead to a much quicker progress, but I would like to stress that a large part of the work was done at first independently and then in any case separately by the two groups, as a

cross-check. Christian played a very important role on the Hamburg side, at first following Gonzalo's more mature leadership, but always doing part of the work on his own. In fact in the first two papers Christian was the main responsible of the computation of the subleading α' corrections, while the third paper is even more the fruit of the independent work of Christian and includes a great deal of his explicit model building for the two field case. Christian was able to find explicit metastable de Sitter solutions, which do not need additional uplifting, but are more involved than simple race-track superpotentials and do not come directly from first principle. They are nevertheless a very important achievement as a proof of existence. It goes to Christian's merit that he was able to treat even such more complex cases and it can explain why no similar solutions were found earlier.

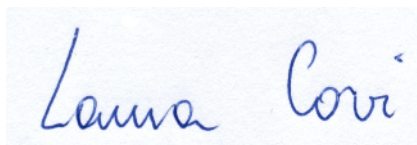
Christian defended very successfully his Ph. D. thesis on "De Sitter vacua and Inflation in no-scale string models" in July 2009. After his Ph. D. he decided to change his research interests going towards phenomenological applications of supersymmetry and joined the group of Gudrun Hiller in Dortmund. I am sure she will tell you more about his activities there. Clearly moving to a different field was one of the reason Christian has been less productive in the year after the Ph. D., but he completed in the last two years quite a number of papers and on very different directions and fields, showing quite clearly his versatility.

Christian is very quick to grasp new ideas and problems and to connect cosmological and particle physics implications. He has good skills with computers, but does not rely only on numerical results for the understanding of the solutions. He is a physicist who prefers to first think deeply on the problem and only later start computing, and this, together with his youth and inexperience, has been the main reason why at the beginning he did not take the lead on our project and why he has not published more papers. But at the same time, his more reflective and deep-thinking character makes him a solid and good researcher, and, in the long distance, could turn out to be a very good asset in the solution of the more involved problems.

Christian enjoys working in a group and in a close collaboration; he has also a good background knowledge on theoretical physics beyond the subject directly related to his thesis or his more recent work. I think that Christian is a very promising and talented researcher and therefore I would like to recommend him strongly as a post-doc in Your Institute.

Best regards,

Laura Covi

A handwritten signature in blue ink that reads "Laura Covi". The signature is written in a cursive, flowing style. The first name "Laura" is written in a larger, more prominent script, and the last name "Covi" is written in a slightly smaller, more compact script to its right.