Il Colle di Galileo

Final Report of the GGI workshop: String Theory from a Worldsheet Perspective

Mar 25, 2019–May 10, 2019
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1 Attendance and funding

The workshop took place over a period of seven weeks from the 25th of March to the 10th of May 2019. The programme was very successful, with an average of 25-30 participants per week and a peak of more than 40 participants during the "Focus Week" in week 4, for a total of over 90 participants. The complete list of participants can be found at the end of this report.

The workshop covered more or less all the aspects of string theory that use worldsheet techniques, bringing together various scientific communities (focusing on ambitwistor strings, string perturbation theory, string field theory, the pure spinor approach and topological string theory to name but a few). The first week offered a series of review lectures, which attracted several students but were helpful also more broadly to anyone who wished to have an introductory overview of the areas of research covered by the workshop. During week four, there was a conference-like meeting (the "Focus Week") which covered the latest progress in the field with five review talks (1h15) and fifteen (45m) talks. The workshop ended with a conference that combined the annual String Field Theory meeting with some of the other closely related areas covered by our workshop. During the remaining weeks, we had one talk per day and plenty of time was devoted to small group discussions and collaborations.

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All participants received some form of financial support from the GGI, but most used their own funds to cover some costs. The financial support was mostly used to cover the accommodation expenses of a large fraction of the participants and catering during the workshop and special events. We found that providing catering for the duration of the entire workshop significantly simplified the organisation, created a collegial atmosphere and facilitated scientific interaction. Participants contributed mostly by covering their travel expenses, but a few participants also used personal grants to cover their accommodation. In addition, three distinguished scientists (Paolo Di Vecchia, Hirosi Ooguri and Ashoke Sen) attended the programme as "Simon's fellows" and participated for an extended period of four (Ooguri), five (Di Vecchia) or six (Sen) weeks. The workshop received no financial support from sources other than the GGI and the Simon's Foundation.

2 Activities

2.1 Review Lectures (week 1)

During the first week, we had three cycles of review lectures. The goal was to establish a common background for the central topics of the workshop. The lecturers/topics were

- T. Erler: "Quantum properties of String Field Theory"
- K.S. Narain: "Topological Strings and Amplitudes"
- O. Schlotterer: "Superstring Amplitudes in RNS and Pure Spinor Formalism'

This event was well attended and, as mentioned, attracted several students.

The lectures were recorded and are available on the conference website http://www.ggi.infn.it/showevent.pl?id=311

2.2 Focus Week (week 4)

The aim of the focus week was to cover the latest developments in all areas relevant to the workshop. Each session/day focused broadly on an area of research, such as ambitwistor strings, string effective action from (multi)loop amplitudes, pure spinor approach, string field theory, high energy and soft limits of string amplitudes. The event was very successful with more than forty participants and twenty talks.

The talks were recorded and are available on the conference website http://www.ggi.infn.it/showevent.pl?id=309

The list of speakers was (in order of time of their presentation): L. Mason, S. Stieberger, R. Monteiro, P. Tourkine, D. Skinner, M. Green, K. Wen, A. Basu, B. Pioline, J. Schwarz, N. Berkovits, C. Mafra, X. Yin, E. Dudas, A. Sen, P. Di Vecchia, M. Porrati, A. Tseytlin, M. Bianchi and G. Veneziano.

2.3 String Field Theory and String Perturbation Theory (Conference) (week 7)

The conference was the final event of the workshop and coincided with the 10th edition of the annual conference on String Field Theory and related aspects. Previous editions were held in India (2018), Brazil (2016), China (2015), Italy (2014), Israel (2012), Czechia (2011), Japan (2010), Russia (2009), Germany (2008). Given the theme of the workshop, this year's related aspect was string perturbation theory.

The number of participants was around 35 and we had 27 scientific talks and a final discussion on the future perspective on the subject.

The list of speakers was: L. Bonora, H. Erbin, T. Erler, P. Grassi, T. Kojita, M. Kroyter, M. Kudrna, H. Kunitomo, R. Jusinskas, T. Masuda, H. Matsunaga, S. Mizera, F. Moosavian, Y. Okawa, H. Ooguri, I. Pesando, I. Sachs, O. Schlotterer, M. Schnabl, A. Sen, D. Skliros, T. Takahashi, T. Taylor, P. Vanhove, J. Vosmera.

The talks were recorded and are available on the conference website http://www.ggi.infn.it/showevent.pl?id=308

2.4 Weekly talks (weeks 2,3,5,6)

The normal schedule of the workshop contemplated one 1h talk (plus discussion) per day, which served also as a meeting point for all the participants. Then plenty of time was devoted to small group discussions and collaborations and we also organised some extra activities in response to requests by participants, such as an afternoon with a series of short talks by PhD students, a day focused on gravitational scattering (both from the soft-theorem point of view and using the eikonal approach), and an afternoon dedicated to string theory on AdS_3. The list of speakers during one of these weeks (in order of time of their presentations) was: R. Donagi, M. Haack, A. Lipstein, M. Berg, S. Abel, D. Israel, M. Lize, M. Guillen, L. Nogueira, D. Zavaleta, L. Ypanaque, Y. Geyer, P. Di Vecchia, G. D'Apollonio, A. Sen, D. Colferai, R. Marotta, H. Partouche, S. Giusto, A. Sen, S. Hohenegger, I. Antoniadis, J. Maldacena, C. Hull.