

Report from the workgroup "Gauge theories and (super)gravity: several correspondences" (RTN Winter school, Trieste)

The workgroup which took place in Trieste during the RTN winter school, was entitled "BPS sectors of AdS/CFT" and was focused on a series of recent papers by Berenstein and Lin, Lunin and Maldacena (LLM) plus further related works concerning a particular sector of the AdS/CFT correspondence (see References below). These works restrict to particular supersymmetric subsectors of the theory, and give a strong control on both sides of the correspondence i.e. the SYM theory and the gravity theory. In the case of the half BPS sector of $AdS_5 \times S^5$, the gauge theory reduces to a matrix model and the full supergravity solution has been obtained by LLM, describing the effect of D3-branes and new vacua of the theory.

Two young researchers working on the field, Pedro Silva and Marco Caldarelli, presented the argument in a very clear and complete way, while driving the discussion. The workgroup was organized into two sections, more than two hours each. The first time Pedro Silva made a general introduction primarily concentrated on the original model proposed by Berenstein and successively developed by Lin, Lunin and Maldacena, in the context of $AdS_5 \times S^5$. The second time Marco Caldarelli described various applications concerning M-theory in $AdS_7 \times S^4$ or $AdS_4 \times S^7$ with M2 and M5 branes, 1/4 BPS excitations in AdS_5 and their connection with Quantum Hall Effect, D1-D5 system in $AdS_3 \times S^3$ and superstar solutions. In the last part of the workgroup a brief review of Quantum Hall Effect was presented by G. Maiella.

The number of participants to the workgroup was unexpectedly high. More than 50 people came the first time and around 30 the second time. The first time many young participants were people not familiar with the subject who attended the workgroup to learn. The second time, instead, primarily people familiar with the subject were present. While not many questions were asked during the general presentation, a considerable number of questions and comments came the second time and the discussion ended up to be very lively and fruitful. In particular, for many people it turned out to be very useful to have a good updating on the most recent developments on these issues.

References:

1. D. Berenstein, "A toy model for the AdS/CFT correspondence" (hep-th/0403110)
2. H. Lin, O. Lunin and J. Maldacena, "Bubbling AdS space and 1/2 BPS geometries" (hep-th/0409174)
3. N.V. Suryanarayana, "Half-BPS giants, free fermions and microstates of superstars" (hep-th/0411145).
4. M. M. Caldarelli, D. Klemm and P. J. Silva "Chronology protection in anti-de Sitter" (hep-th/0411203).
5. J. T. Liu, D. Vaman and W. Y. Wen "Bubbling 1/4 BPS solutions in type IIB and supergravity reductions on $S^n \times S^n$," (hep-th/0412043).