

Institut Henri Poincaré
11 rue Pierre et Marie Curie, 75231 Paris cedex 05
String Theory in Greater Paris

<p>Rencontres Théoriciennes</p> <p>“Supergravité, théorie des cordes et théorie M”</p>
--

Jeudi 7 Fevrier 2019, 11:40

Andrea Puhm

CPHT, Palaiseau

Conformally soft photons and gravitons

The four-dimensional S-matrix will be reconsidered as a correlator on the celestial sphere at null infinity. Asymptotic particle states can be characterized by the point at which they enter or exit the celestial sphere as well as their $SL(2, \mathbb{C})$ Lorentz quantum numbers : namely their conformal scaling dimension and spin $h \pm \bar{h}$ instead of the energy and momentum. This characterization precludes the notion of a soft particle whose energy is taken to zero which plays an important role in the conventional formulation of quantum field theory scattering amplitudes. We propose that in this new formulation it should be replaced by the notion of a conformally soft particle with $h = 0$ or $\bar{h} = 0$. For photons and gravitons we explicitly construct conformally soft $SL(2, \mathbb{C})$ currents with dimensions $(1, 0)$ and $(2, 0)$ respectively and identify them with the generators of a $U(1)$ Kac-Moody symmetry on the celestial sphere and celestial conformal symmetry. BMS supertranslations are generated by a spin-one current whose OPE relation looks quite unusual from the celestial CFT_2 perspective but is equivalent to the leading soft graviton theorem and may usefully constrain celestial correlators in quantum gravity.

Institut Henri Poincaré, salle 314, 3^{ème} étage

Retrouvez les activités de la communauté parisienne de théorie des cordes sur
[http ://string.lpthe.jussieu.fr](http://string.lpthe.jussieu.fr)
La liste de tous les séminaires en région parisienne est disponible sur
[http ://string.lpthe.jussieu.fr/semparis](http://string.lpthe.jussieu.fr/semparis)
