



Contribution ID: 8

Type: **not specified**

Lightfront field theory and intense laser physics

Intense laser-matter interactions offer not only a novel experimental testing ground for fundamental physics, but also an ideal setting for exploring lightfront field theory.

I will give an overview of the application of lightfront field theory to laser-matter interactions in the relativistic and quantum regime. Topics will include non-perturbative pair production and the physical consequences of lightfront zero modes, non-perturbative methods based on superintegrable lightfront dynamics, Lorentz-invariance violating theories, and higher order processes such as electromagnetic cascades.

I will also present recent experimental results on laser-particle scattering and outline future experimental plans at the Extreme Light Infrastructure facility.

References

1. T. Heinzl and A. Ilderton, Phys.Rev.Lett. **118** (2017) no.11, 113202
2. A. Ilderton, Phys.Rev. D **94** (2016) no.4, 045019
3. A. Ilderton, G. Torgrimsson and J. Wårdh, Phys.Rev. D **92** (2015) no.6, 065001

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