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# Automation of analytical calculations in particle physics and gravity with Redberry CAS

*Monday 18 January 2016 14:00 (25 minutes)*

With the increasing complexity of HEP problems, the performance of computer algebra systems (CASs) may become a bottleneck in a real calculation. For example, multiloop calculations in SM may involve thousands of diagrams and require to perform a huge amount of Dirac algebra and related simplifications in order to prepare expressions for further numerical analysis; calculations in field theory and gravity involve a huge amount of sophisticated tensor algebra, simplifications of Riemann monomials etc. Redberry is a free high-performance CAS written in Java and focused on the needs of (quantum) field theory. My talk will cover two applications:

1. Loop calculations in SM with FeynArts+Redberry+FIRE pipeline
2. Deriving Feynman rules and calculating oneloop counterterms in gravitational theories

One of the advantages of Redberry is that calculations can be easily distributed over several threads/machines. I will give an example of how calculation of some SM process can be distributed in Amazon EC2 cloud.

**Author:** POSLAVSKY, Stanislav (IHEP, Protvino)

**Presenter:** POSLAVSKY, Stanislav (IHEP, Protvino)

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