# Summary track 3 Techniques and automation of loop calculations

# Automation: general tools(1)

FeynRules 1.8 beta

See previous BATS@LHC meeting

FormCalc improvements

Optimizations 1) Due to Form 4 improvments 2) Vectorization of helicity loop in the generated code 3) OPP optimization

Developments in Form 4:

Code generation optimization
 Horner scheme for multivariate polynomials

# Automation: general tools (2)

#### DCM

Direct Computation Methodes Computes numerically integrals with finite values of epsilon than takes the limit -> 0

Up to 2 loops with 4 external legs

Not competitive yet

SecDec2.1:

### Automation: general tools (3)

Other tools were presented:
BlackHat (W + 5j)
GoSAM (H + 2/3j, BSM)
NJets: 1 loop, #j < 5</li>
OpenLoops (WW+0,1j)

# Part2: Loop calculation techniques

Many talks on how to compute loop integrals

J. BluemLein: «Harmonic, generalized harmonic, cyclotomic and binomial sums, polylogarithms and special numbers»

Some packages on loop integral reduction

LiteRed: «A new powerful tool for the reduction of multiloop integrals»