

# GeantV performance

June 26, 2018

# Benchmarking GeantV against Geant4

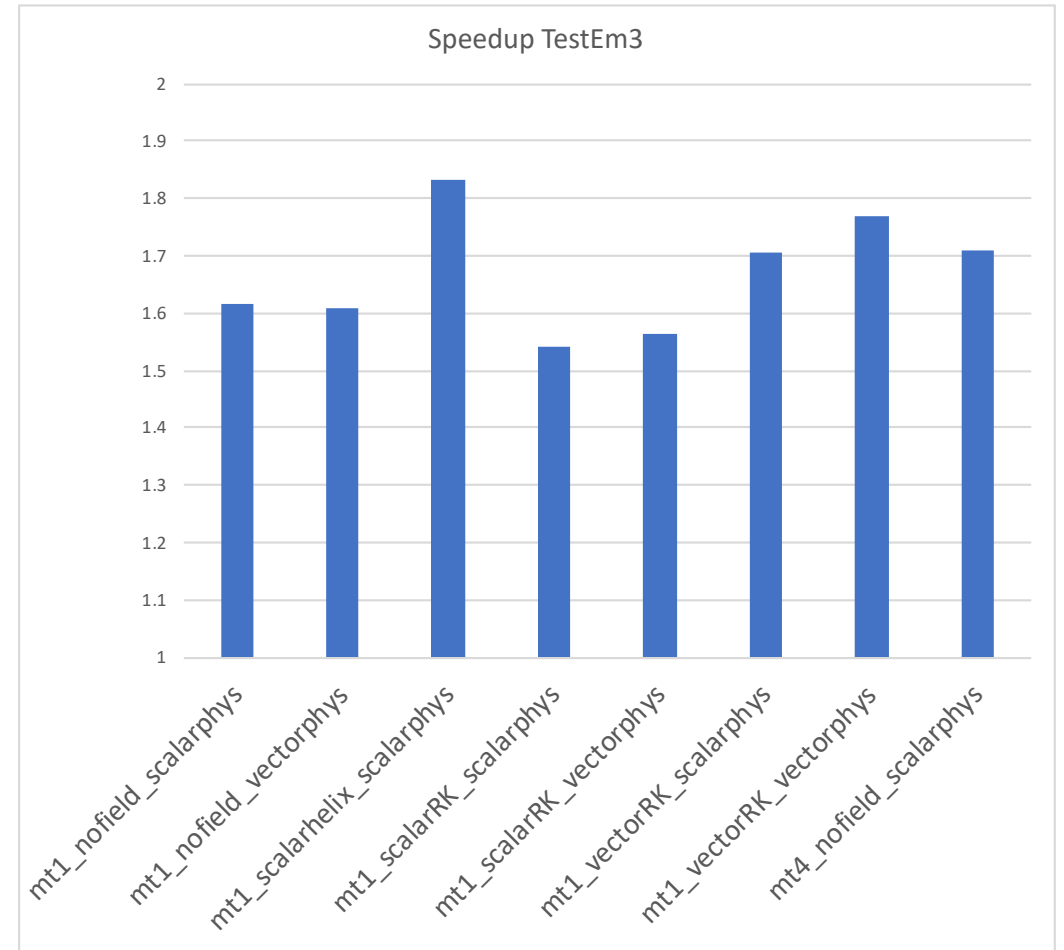
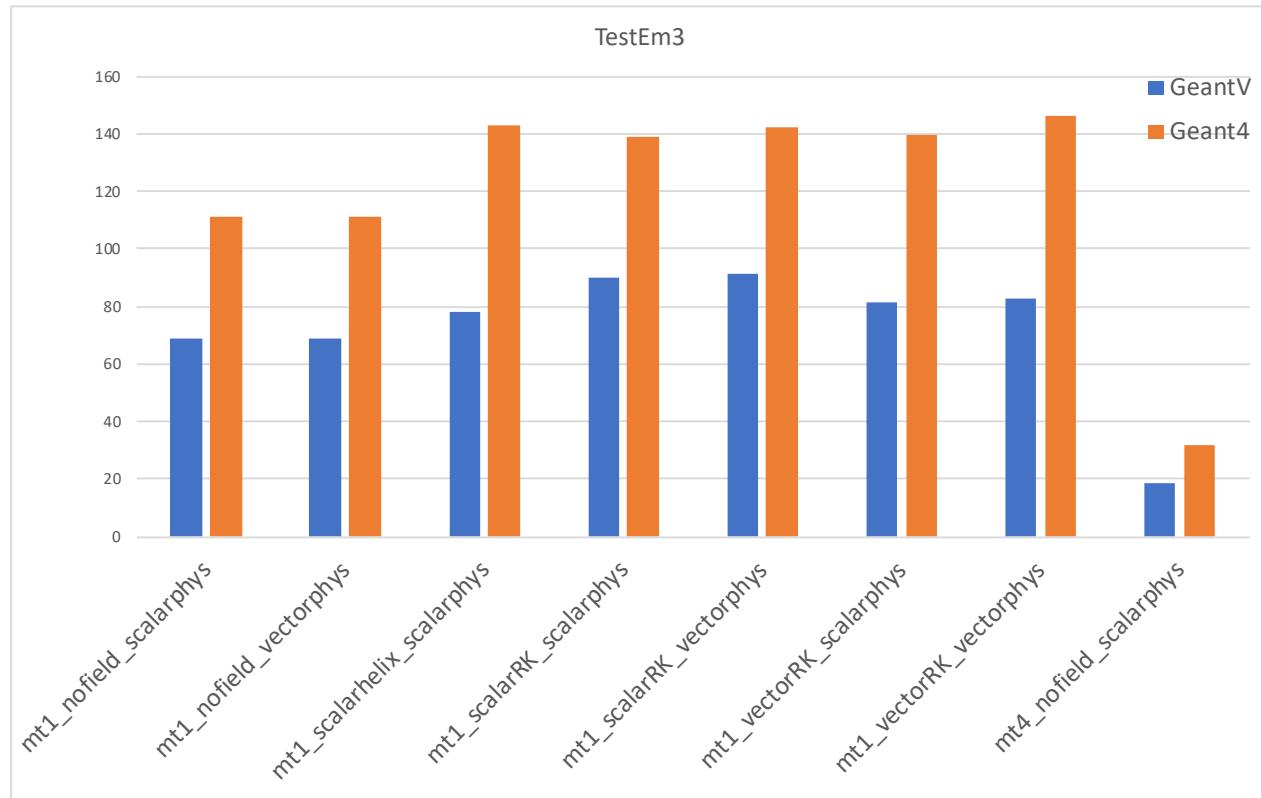
- New folder examples/benchmarks/[example\_name]
  - For now only for TestEm3 and FullCMS
- Several default configurations
  - TestEm3: 100 events / 1 primary each, 100 GeV electrons
  - FullCMS: 10 events / 10 primaries each, 100 GeV electrons
    - mt1-nofield-scalarphys
    - mt1-nofield-vectorphys
    - mt1-scalarhelix-scalarphys
    - mt1-scalarRK-scalarphys
    - mt1-scalarRK-vectorphys
    - mt1-vectorRK-vectorphys
    - mt4-nofield-scalarphys
- Installs in the GeantV installation folder, run like:
  - FullCMS.run [configuration.sh] -> produces bench\_configuration.out file containing timings
- To run all benchmarks: bench\_all.sh

# Profiling GeantV

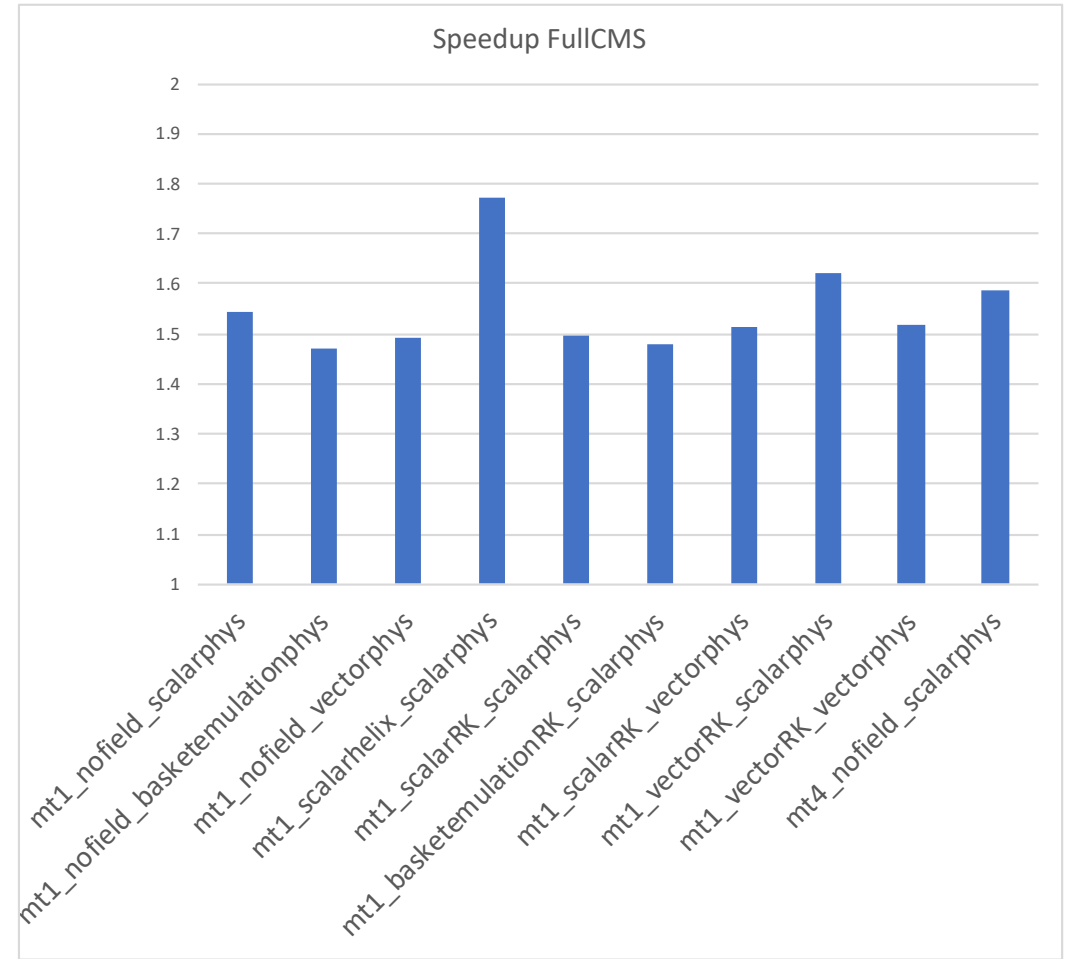
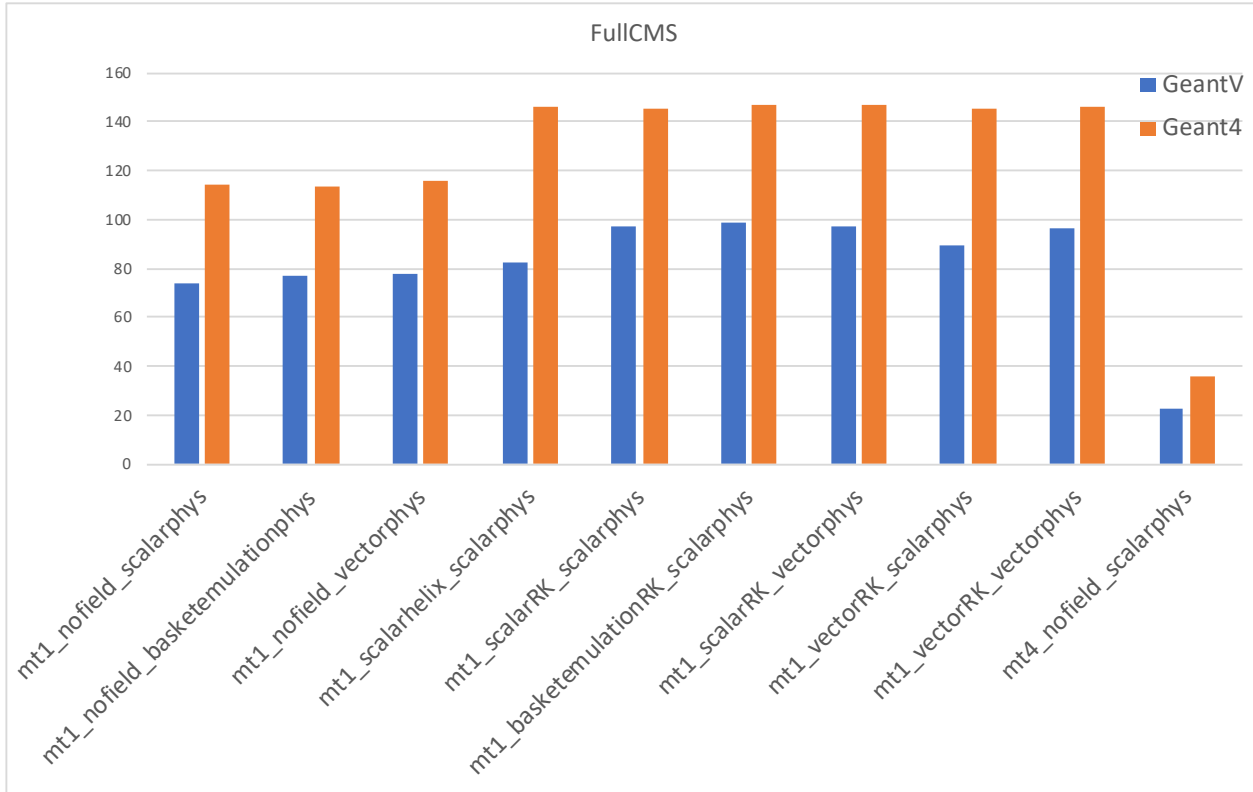
- Install gperftools, see:  
[https://gitlab.cern.ch/GeantV/geant/blob/master/howto\\_gperftools.md](https://gitlab.cern.ch/GeantV/geant/blob/master/howto_gperftools.md)
  - The method RunSimulation gets automatically profiled, resulting in the file: `$GEANT_PERFTOOLS_FILE`
- Inspect the profile using the pprof tool from gperftools:
  - `pprof [--focus=method_name] [--nodecount=maxvis_nodes] [--nodefraction=0.001] [--edgefraction=0.001] [--ps]`
  - This will display profiling info for method\_name, showing maximum maxvis\_nodes, dropping nodes and edges with <0.1% hits, displaying a graph using ghostview



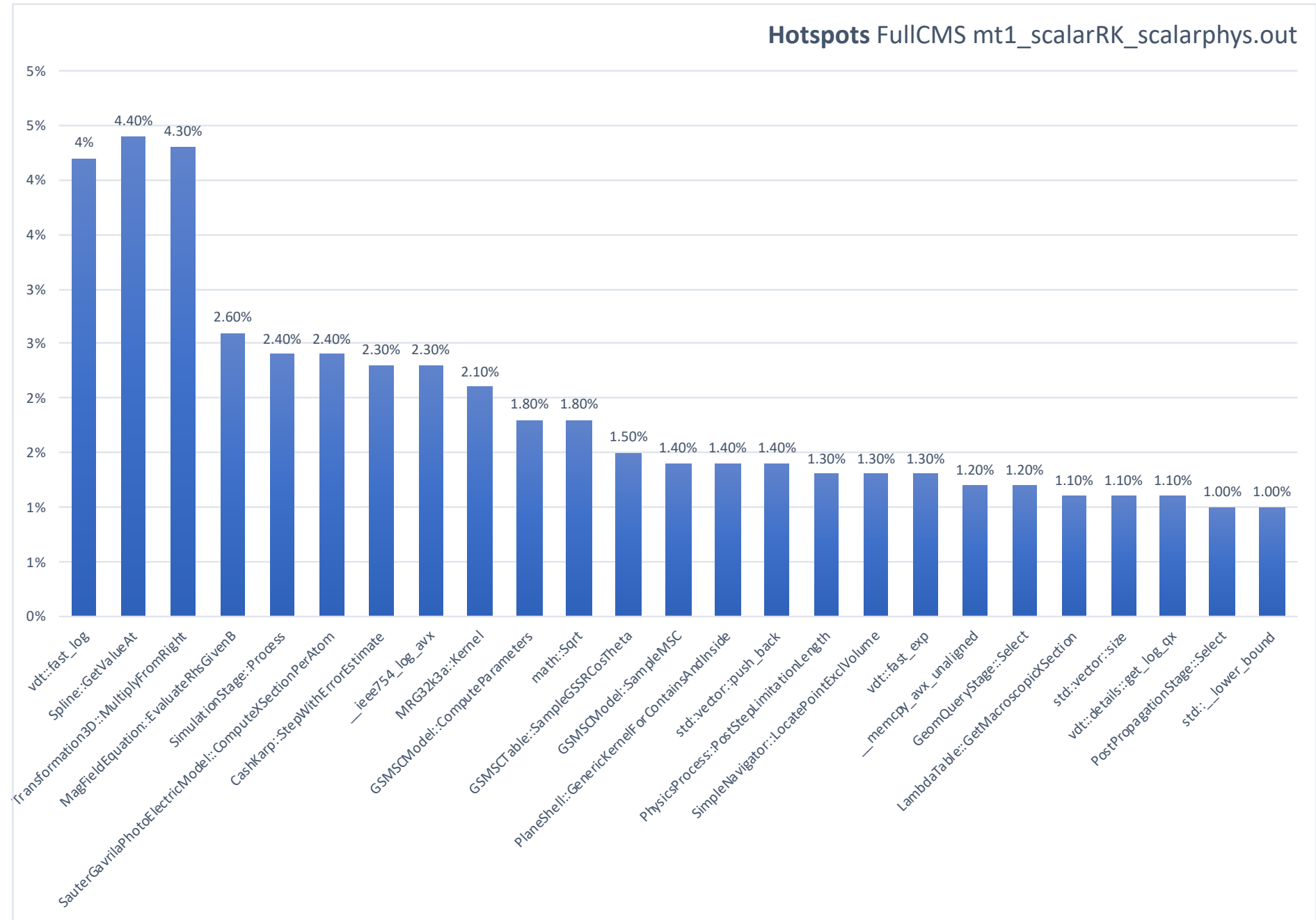
# Current benchmarks, TestEM3



# Current benchmarks, TestEM3

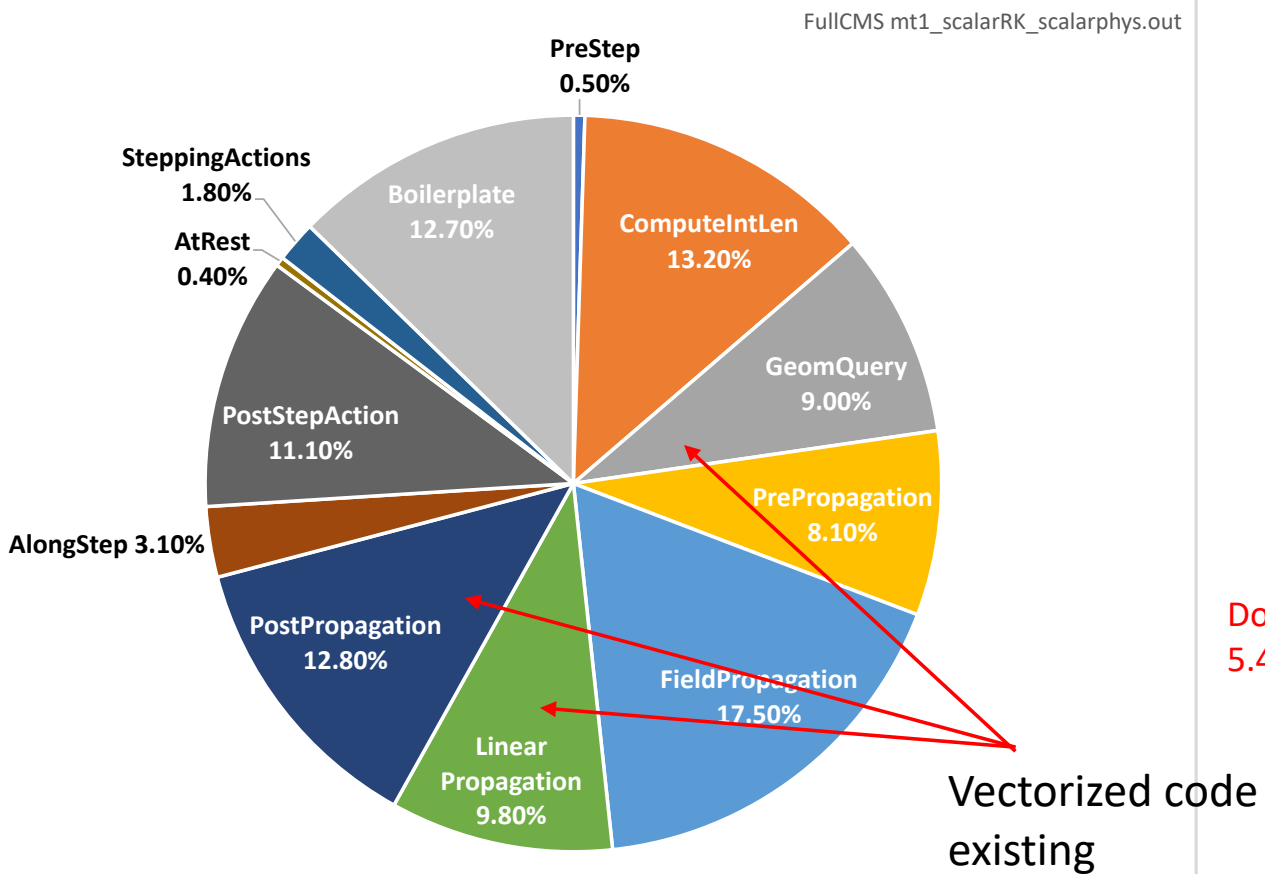


# Hotspots

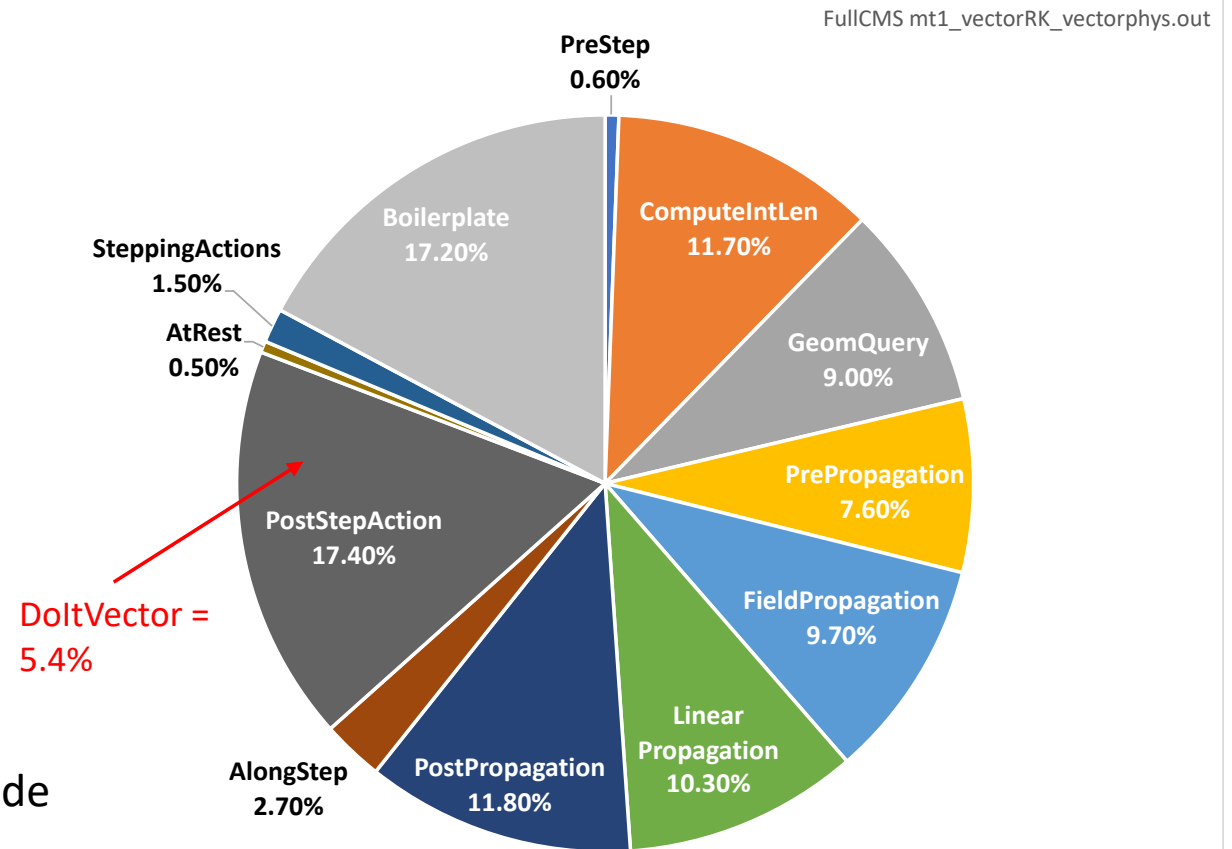


# Simulation stage profiles

## Scalar physics and field



## Basketized physics and field





# ToDo's

- Clarify the PostStep issue
- Fix and finish vectorized MSC
- Deal better with geometry (specialized navigators)
- Fix geometry matrix multiplication hotspot
- All that can bring us to 2x factor by the end of the year