Madgraph4gpu progress and WIP: madevent + cudacpp integration (multichannel...)

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(as usual, with a lot of help from Olivier and others!)

Madgraph on GPU development meeting, 8th June 2022

https://indico.cern.ch/event/1168326

Overview – progress last week and TODO

- Follow up on my May 31 talk (mainly on comparison of Fortran vs cudacpp)

- Completed first patch for multichannel integration into cudacpp plugin – PR #465
  - Integrated Olivier's standalone_gpu into cudacpp and code generation of madevent+cudacpp code #342
  - Removed all forces of large (orders of magnitude!) Fortran/cudacpp differences in physics results #417
    - Cudacpp must use the "SDE=1" single-diagram enhancement strategy #467
    - Debugged Fortran/cudacpp differences in helicity filtering: use threshold LIMHEL=0 in both for now #419
  - Fixed channel ID numbering (NB: number amplitudes ≥ number diagrams ≥ number channels) #472
    - Channel ID is the diagram ID in [1, $N_{diagrams}$], note Feynman diagrams with more than 1 amplitude are not channels
  - Fixed code generation for standalone cudacpp, different code base than madevent+cudacpp #473
    - Technically: multichannel strategy details are not known to cudacpp if madevent code is not generated by python
    - Minor TODO: will eventually keep <proc>.mad and <proc>.sa (the latter, replacing <proc> and <proc>.auto) #478
  - Thanks to Olivier for the help (as usual!) debugging many of these complex issues!...

- Still on the critical path before an alpha release for the experiments
  - *TODO: move upstream from bazaar to github and eventually move to branch 340 (from 311) #474 , #479*
    - Thanks to Olivier: https://github.com/mg5amcnlo/mg5amcnlo/tree/3.1.1_lo_vectorization
  - *TODO: random choice of color and helicity (changes in Fortran, Bridge and cudacpp) #402, #403*
    - Can already produce cross sections in cudacpp (not unweighted events) using "dummy" random color/helicity API?
    - Afterwards: switch off Fortran MEs and ONLY use cudacpp MEs, run the full survey/refine chain in cudacpp...
  - *TODO: improve numerical precision to better than the current ~ E-3 (due to alphas?) #476*
  - *TODO: agree on how to backport Fortran patches upstream (and how to include cudacpp as a plugin)*

- Other (less critical) desiderata
  - *TODO: extend GPU offload to 500k+ events per grid #460 (crashes, out of memory in Fortran arrays?)*
  - *TODO: cross-check again (A-iB)M(A+iB) → AMA+BMB in color algebra #475*
  - *TODO: test multichannel in standalone check.exe/gcheck.exe (currently use channel=0) #466*