



# Madgraph4gpu cudacpp WIP: copyright and licensing

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*Madgraph on GPU development meeting, 25<sup>th</sup> April 2023*

*<https://indico.cern.ch/event/1275610>*

***DISCLAIMER: I am not a lawyer!***

***My proposal is based on my limited understanding of these issues...***

***(I will not repeat this disclaimer explicitly on each slide, but you should assume that I have done that implicitly!)***

# MG5aMC CUDACPP copyright and licensing

- Why now?
  - The CERN IT Innovation Review Board in March recommended that we mark/protect “the intellectual property of CERN” in the developments involving CERN personnel
  - We will soon prepare public (pre-)release(s) of the software, we should solve this before
  - We may want to repackage the software repository (and/or create new ones)
- **I prepared a draft PR: <https://github.com/madgraph5/madgraph4gpu/pull/643>**
  - The proposal covers two related pieces of software for CUDACPP developments
    - the CUDACPP code-generating plugin (Python plugin and CUDA/C++ templates)
    - the CUDACPP-generated code
  - The proposal covers three aspects of the problem for CUDACPP developments
    - Copyright – I propose “CERN and UCLouvain” (rather than the individual authors)
    - License – I propose LGPL v3 (the GNU Lesser General Public License version 3)
    - Authors – I propose 5 authors and a list of collaborators
  - The proposal covers the issues above at two levels:
    - With “central” files COPYRIGHT, COPYING, COPYING.LESSER, AUTHORS
    - With copyright/license/author headers in each source file

# Where do we start? the MG5aMC license

- See <https://github.com/mg5amcnlo/mg5amcnlo/blob/main/madgraph/LICENSE> :

The MadGraph5\_aMC@NLO software comes with the following Open Source License, adapted from the **University of Illinois/NCSA license**.

Copyright (c) 2009, 2013, the MadTeam. All rights reserved.

Developed by the "MadTeam", i.e.

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This is distributed with the code-generating framework, but not in generated code

# Where do we start? the MG5aMC authors

- See <https://github.com/mg5amcnlo/mg5amcnlo/blob/main/madgraph/AUTHORS> :

```
*****
**
**              A U T H O R S              **
**              **                          **
**              &                          **
**              **                          **
**              C O N T R I B U T O R S     **
**              **                          **
*****

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```

This is distributed with the code-generating framework, but not in generated code

# Where do we start? the MG5aMC code files

- e.g. <https://github.com/mg5amcnlo/mg5amcnlo/blob/main/Template/LO/bin/madevent> :  
– also copied as-is to generated code, e.g.  
[https://github.com/madgraph5/madgraph4gpu/blob/master/epochX/cudacpp/gg\\_tt.mad/bin/madevent](https://github.com/madgraph5/madgraph4gpu/blob/master/epochX/cudacpp/gg_tt.mad/bin/madevent)

```
#!/usr/bin/env python3

#####
#
# Copyright (c) 2009 The MadGraph5_aMC@NLO Development team and Contributors
#
# This file is a part of the MadGraph5_aMC@NLO project, an application which
# automatically generates Feynman diagrams and matrix elements for arbitrary
# high-energy processes in the Standard Model and beyond.
#
# It is subject to the MadGraph5_aMC@NLO license which should accompany this
# distribution.
#
# For more information, visit madgraph.phys.ucl.ac.be and amcatnlo.web.cern.ch
#
#####
```

This kind of headers is distributed with the code-generating framework, and in some (not all) generated code

# Constraints on madgraph4gpu developments

- Our work is a derivative of MG5aMC (and is used in combination with it)
  - I think that we should acknowledge the authors and their copyright
  - But we are not forced to use the same NCSA license
- Our work will be used with other software in combined projects
  - We should avoid licenses like GPL which forbid linking our libraries to non-GPL projects

# Proposed license: LGPL

- Our libraries can be linked to any software, free or proprietary (unlike with GPL)
- Our source code can be modified, but derivative code must remain free and LGPL
- In practice
  - mention LGPL in the central COPYRIGHT file and in each file header
  - add central COPYING and COPYING.LESSER files
  - the above, both in the code-generating plugin and in generated code

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Licensed under the GNU Lesser General Public License (version 3 or later).  
All rights not expressly granted are reserved.

The copyright and license notice above cover the CUDACPP code-generating plugin of the MadGraph5\_aMC@NLO (in the following "MG5aMC") software, and all code generated using that plugin. These are collectively referred to as "this work" or "the MG5aMC CUDACPP plugin and the code that it generates", or more simply as "the MG5aMC CUDACPP plugin", in the following and throughout this work.

The MG5aMC CUDACPP plugin and the code that it generates are based on the initial work on porting MG5aMC to GPUs using CUDA and on speeding up MG5aMC on CPUs using vectorized C++ by three original authors from CERN and UCLouvain.

The full development team currently includes the following authors :

Stephan Hageboeck (CERN)  
Olivier Mattelaer (Universite Catholique de Louvain, original author)  
Stefan Roiser (CERN, original author)  
Andrea Valassi (CERN, original author)  
Zenny Wettersten (CERN)

See <https://github.com/madgraph5/madgraph4gpu> for more details. For the full list of authors and collaborators of this work, see the file "AUTHORS" in the same directory as this "COPYRIGHT" file in the source code of the plugin.

The MG5aMC CUDACPP plugin and the code that it generates are derived from, and are intended to be used in combination with, the MG5aMC software and the code that it generates. *The MG5aMC software is developed by the MadGraph5\_aMC@NLO development team and contributors, also known as the "MadTeam", who are the owners of its copyright and have licensed it as specified in <https://github.com/mg5amcnlo/mg5amcnlo/blob/main/madgraph/LICENSE>.*

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# Proposed COPYRIGHT file

This would be distributed with the code-generating plugin, and also in generated code



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All rights not expressly granted are reserved.

#### # Authors

The development team of the MG5aMC CUDACPP plugin and of the code that it generates includes the following authors:

Stephan Hageboeck (CERN)  
Olivier Mattelaer (Universite Catholique de Louvain, original author)  
Stefan Roiser (CERN, original author)  
Andrea Valassi (CERN, original author)  
Zenny Wettersten (CERN)

#### # Collaborators

The development team of the MG5aMC CUDACPP plugin and of the code that it generates benefitted significantly from the much appreciated and thankfully acknowledged collaboration with the following collaborators:

Tyler J. Burch (Argonne National Laboratory)  
Taylor Childers (Argonne National Laboratory)  
Laurence Field (CERN)  
Walter Hopkins (Argonne National Laboratory)  
Nathan S. Nichols (Argonne National Laboratory)  
Andreas Reepschlaeger (CERN)  
Taran Singhanian (PES University Bangalore)  
David Smith (CERN)  
Carl Vuosalo (University of Wisconsin-Madison)  
Joergen Teig (CERN)

# Proposed AUTHORS file

This would be distributed with the code-generating plugin.

But not in generated code?  
(because otherwise I think we should add the MG5aMC authors file too)

# Proposed central files

Code-generating plugin,  
only in madgraph4gpu

```
bash > pwd
<...>/madgraph4gpuX/epochX/cudacpp

bash > ls -1F
AUTHORS@
CODEGEN/
COPYING@
COPYING.LESSER@
COPYRIGHT@
ee_mumu.mad/
ee_mumu.sa/
gg_ttggg.mad/
gg_ttggg.sa/
gg_ttgg.mad/
gg_ttgg.sa/
gg_tt.mad/
gg_tt.sa/
gg_tt.mad/
gg_tt.sa/
gq_ttq.mad/
gq_ttq.sa/
heft_gg_h.sa/
smeft_gg_tttt.sa/
tmad/
tput/
```

Code-generating plugin,  
now in madgraph4gpu,  
later in mg5amcnlo

```
bash > pwd
<...>/madgraph4gpuX/epochX/cudacpp/CO
DEGEN/PLUGIN/CUDACPP_SA_OUTPUT

bash > ls -1F
aloha/
AUTHORS@
COPYING@
COPYING.LESSER@
COPYRIGHT@
__init__.py
madgraph/
model_handling.py
output.py
```

```
bash > pwd
<...>/madgraph4gpuX/epochX/cudacpp/CO
DEGEN/PLUGIN/CUDACPP_SA_OUTPUT/
madgraph/iolib/template_files

bash > ls -1F
AUTHORS
CMake/
COPYING
COPYING.LESSER
COPYRIGHT
cpp_model_parameters_cc.inc
cpp_model_parameters_h.inc
gpu/
read_slha.cc
read_slha.h
bash >
```

Generated code

```
bash > pwd
<...>/madgraph4gpuX/epochX/cudacpp/gg_tt.mad

bash > ls -1F
bin/
Cards/
CMake/
CMakeLists.txt
CODEGEN_mad_gg_tt_log.txt
COPYING
COPYING.LESSER
COPYRIGHT
Events/
lib/
MGMEVersion.txt
README
README.systematics
Source/
src/
SubProcesses/
TemplateVersion.txt
```

Should we also  
- add the MG5aMC LICENSE?  
(referenced in COPYRIGHT)  
- add the MG5aMC AUTHORS?  
(or reference it in COPYRIGHT?)  
- or copy them verbatim in our files?

Should we also  
- add the CUDACPP AUTHORS?

# (Aside – about the structure of generated code)

- In the context of copyright but not only, I considered some directory changes
- Currently generated code (e.g. gg\_tt.mad) has these directories
  - Source, with Fortran/MadEvent code
  - src, with CUDACPP code
  - SubProcesses/P1\_etc\_etc, mixing both Fortran/MadEvent code and CUDACPP code
- I considered a different structure:
  - Source and SubProcesses/P1\_etc\_etc with Fortran/MadEvent code
  - *me\_cudacpp, encapsulating all of the CUDACPP generated code*
    - in practice, add me\_cudacpp/src and me\_cudacpp/ SubProcesses/P1\_etc\_etc
    - some advantages: cleanly separate source code and builds, cleaner COPYRIGHT/AUTHORS...
- I am not at all happy of the result, and I dropped the idea for the moment
  - It is also not yet clear if src will eventually be a library (now HelAmps.h is header-only!)
  - Maybe we will come back to something similar in the future – but not now!

# Proposed file headers

- e.g. CPPProcess.cc (modified MG5aMC code – derivative work)

See [https://github.com/madgraph5/madgraph4gpu/blob/c2d22aebd45348e56a0477f0c85bab3d8eab18ab/epochX/cudacpp/gg\\_tt.mad/SubProcesses/P1\\_gg\\_tt/CPPProcess.cc](https://github.com/madgraph5/madgraph4gpu/blob/c2d22aebd45348e56a0477f0c85bab3d8eab18ab/epochX/cudacpp/gg_tt.mad/SubProcesses/P1_gg_tt/CPPProcess.cc)

```
// Copyright (C) 2010 The MadGraph5_aMC@NLO development team and contributors.
// Created by: J. Alwall (Oct 2010) for the MG5aMC CPP backend.
//=====
// Copyright (C) 2020-2023 CERN and UCLouvain.
// Licensed under the GNU Lesser General Public License (version 3 or later).
// Modified by: S. Roiser (Feb 2020) for the MG5aMC CUDACPP plugin.
// Further modified by: S. Hageboeck, O. Mattelaer, S. Roiser, A. Valassi, Z. Wettersten
// (2020-2023) for the MG5aMC CUDACPP plugin.
//=====
// This file has been automatically generated for CUDA/C++ standalone by
// MadGraph5_aMC@NLO v. 3.5.0_lo_vect, 2023-01-26
// By the MadGraph5_aMC@NLO Development Team
// Visit launchpad.net/madgraph5 and amcatnlo.web.cern.ch
//=====
...
```

This kind of headers would be distributed with the code-generating plugin, and in all generated code

- e.g. MadgraphTest.h (brand new code – not a derivative from MG5aMC)

See [https://github.com/madgraph5/madgraph4gpu/blob/c2d22aebd45348e56a0477f0c85bab3d8eab18ab/epochX/cudacpp/gg\\_tt.mad/SubProcesses/MadgraphTest.h](https://github.com/madgraph5/madgraph4gpu/blob/c2d22aebd45348e56a0477f0c85bab3d8eab18ab/epochX/cudacpp/gg_tt.mad/SubProcesses/MadgraphTest.h)

```
// Copyright (C) 2020-2023 CERN and UCLouvain.
// Licensed under the GNU Lesser General Public License (version 3 or later).
// Created by: S. Hageboeck (Dec 2020) for the MG5aMC CUDACPP plugin.
// Further modified by: S. Hageboeck, A. Valassi (2020-2023) for the MG5aMC CUDACPP plugin.
```

# Proposed next steps

- Discuss PR #643, amend any obvious issues if needed, *merge it asap*
  - I am leaving on holiday on Thursday, I would like to get done with this “stuff” before...
- ***NB: THIS IS A FIRST STEP, WE CAN (PROBABLY WILL?) AMEND IT...***
  - We had a first exchange with the CERN IT OSS expert, but we may need to iterate
  - We need to discuss with the full MG5aMC team (Gargnano workshop in Sep 2023?)
- For the SYCL plugin (and others if we want to release them)
  - Identify authors of the plugin itself (Nathan, Taylor... ?)
  - Identify copyright of the plugin itself (Argonne... ?)
  - *License: LGPL if CUDACPP is LGPL, this is a derivative*
  - Create similar central COPYRIGHT and AUTHORS files
  - Add “Created by ... for the MG5AMC SYCL plugin” for new code
  - Add “Modified by ... for the MG5AMC SYCL plugin” for derived code
    - Below the CUDACPP (and MG5aMC where present) headers
  - Proposed timescale: before any release of the SYCL plugin
    - And/or before branching off to a separate repository if this is foreseen