



The NLOAccess framework

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Outline

1. Introduction
2. The NLOAccess framework
3. HELAC-Onia and its web realisation
4. Conclusions

1. Introduction

Introduction - Key concepts

Automation

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Virtual Access

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Automation

Virtual Access

User friendliness

2. The NLOAccess framework

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- MADGRAPH and extension for nPDFs to be included
- ✓ HELAC-Onia is included

3. HELAC-Onia and its web realisation

HELAC-Onia is an automatic matrix element and event generator for heavy quarkonium physics [*H.-S. Shao, Comput. Phys. Commun. 184 (2013) 2562-2570 & Comput. Phys. Commun. 198 (2016) 238-259*]

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- based on off-shell recursion relations

HELAC-Onia - Basic methodology

NRQCD factorisation:

$$\sigma(pp \rightarrow Q + X) = \sum_{i,j,n} \int dx_1 dx_2 f_{i/p}(x_1) f_{j/p}(x_2) \hat{\sigma}(ij \rightarrow Q\bar{Q}[n] + X) \langle \mathcal{O}_n^Q \rangle$$

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- $\langle \mathcal{O}_n^Q \rangle$ are the **LDMEs**

HELAC-Onia - Main features

- **Standard Model** calculations but BSM extension is feasible
- different kind of calculation: multiple quarkonia production, event generation, yields vs polarisation, angular distributions of quarkonia decays...
- reweighting method for estimating renormalisation/factorisation scale and PDF uncertainties
- interface with **LHAPDF**
- interface with **PYTHIA 8**, **QEDPS**

HELAC-Onia Web

Some facts about the web portal:

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Some facts about the web portal:

- reachable at <https://nloaccess.in2p3.fr/H0/>
- note: **preliminary/not definitive!**
- built with Flask Python microframework
- file input as first way to submit a run

HELAC-Onia Web - Updates

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*online guide still missing







HELAC-Onia Web - Homepage

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HELAC-Onia Web | Home x +

https://nloaccess.in2p3.fr/HO/

HELAC-Onia Web **Request Registration** References Contact us Login

Automated perturbative NLO calculation with HELAC-Onia Web

Welcome to HELAC-Onia Web!

HELAC-Onia is an automatic matrix element generator for the calculation of the heavy quarkonium helicity amplitudes in the framework of NRQCD factorization. The program is able to calculate helicity amplitudes of multi P-wave quarkonium states production at hadron colliders and electron-positron colliders by including new P-wave off-shell currents. Besides the high efficiencies in computation of multi-leg processes within the Standard Model, HELAC-Onia is also sufficiently numerical stable in dealing with P-wave quarkonia and P-wave color-octet intermediate states.

Already registered to the portal? Please login.

Do you not have an account? **Make a registration request**

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NLOAccess **IPN** **UCL** **LPTHE** **INFN**

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HELAC-Onia Web - Registration

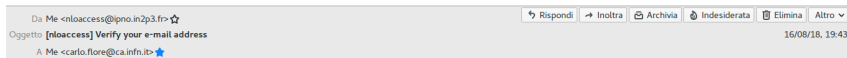
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Dear user,

You started the HELAC-Onia WEB profile creation process. To continue, you need to verify that this address is yours. To do so, please click [here](#). Please note that this link will expire in 24 hours.

Best regards,

--

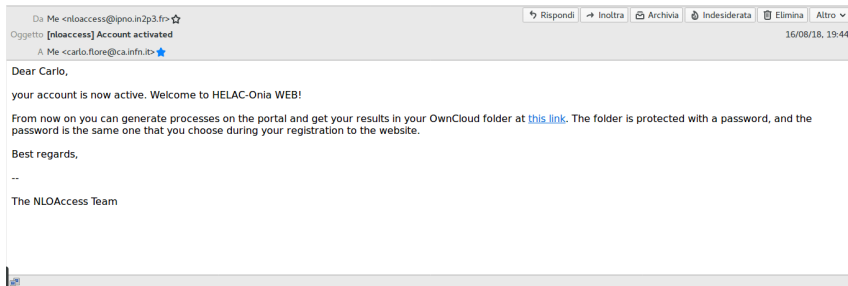
The NLOAccess Team



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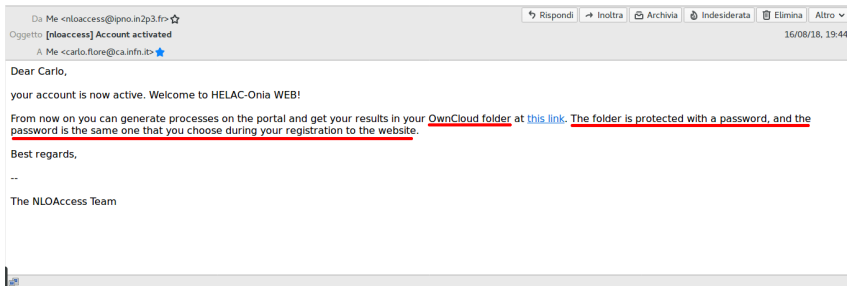
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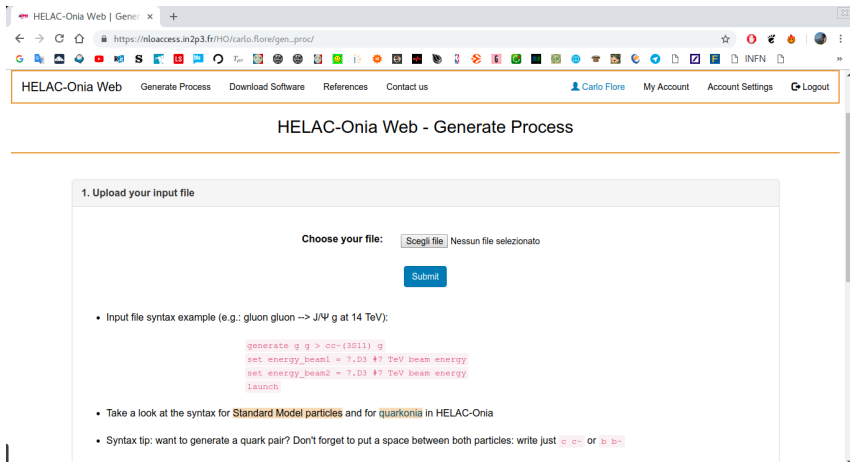
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HELAC-Onia Web - Run submission (I)



The screenshot shows a web browser window with the URL https://nloaccess.in2p3.fr/HO/carlo.flore/gen_proc/. The page title is "HELAC-Onia Web - Generate Process". The navigation bar includes links for "HELAC-Onia Web", "Generate Process", "Download Software", "References", "Contact us", "Carlo Flore", "My Account", "Account Settings", and "Logout".

1. Upload your input file

Choose your file: Nessun file selezionato

- Input file syntax example (e.g.: gluon gluon \rightarrow J/Ψ g at 14 TeV):

```
generate g g > cc-(3S11) g
set energy_beam1 = 7.D3 #7 TeV beam energy
set energy_beam2 = 7.D3 #7 TeV beam energy
launch
```
- Take a look at the syntax for **Standard Model particles** and for **quarkonia** in HELAC-Onia
- Syntax tip: want to generate a quark pair? Don't forget to put a space between both particles: write just `c c-` or `b b-`

HELAC-Onia Web - Run submission (I)

HELAC-Onia Web | Generate Process

HELAC-Onia Web Generate Process Download Software References Contact us Carlo Flore My Account Account Settings Logout

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Submit

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More examples? See this reference

HELAC-Onia Web - Run submission (I)

HELAC-Onia Web | Generate x +

https://nloaccess.in2p3.fr/HO/carlo.flore/gen_proc/

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launch

HELAC-Onia Web - Run submission (II)

HELAC-Onia Web | Guide: x

Process generation Download Software References Contact us

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HELAC-Onia - Guided file submission

Create an input file

Input next command(s):

Add command(s)

Remove line(s) containing:

Remove line(s)

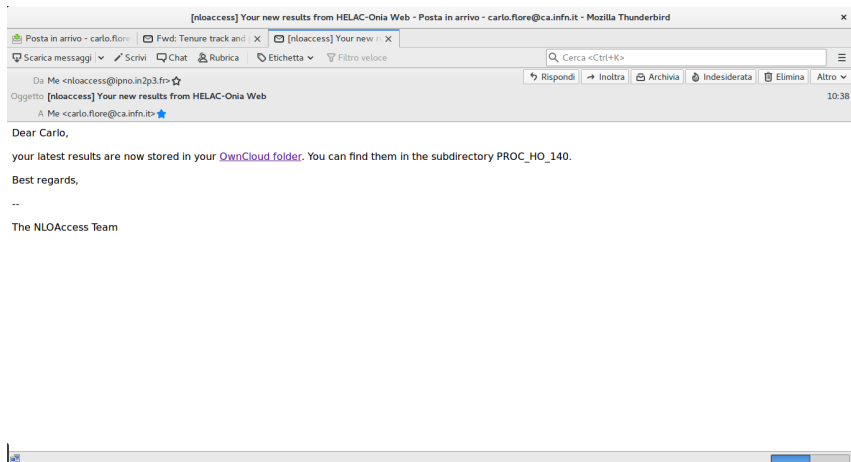
Clear file

Submit job

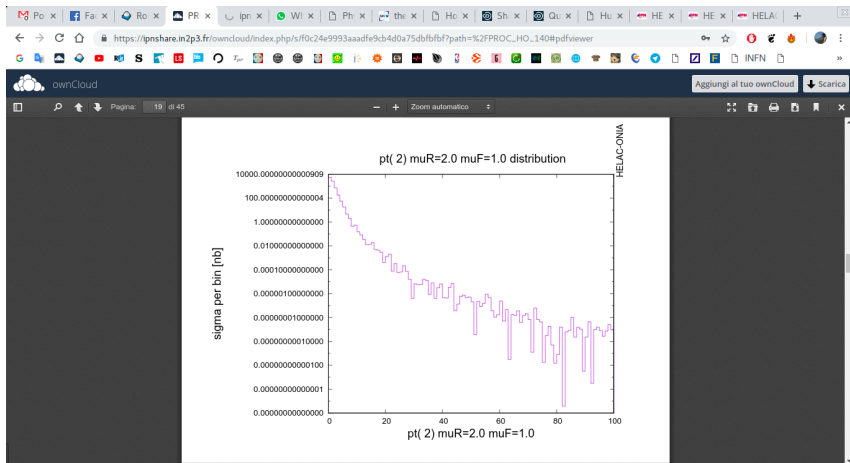
Your input file:

```
generate p p > cc-(3s11) cc-(3s11) g
set energy_beam1 = 3500.d0
set energy_beam2 = 3500.d0
set qcd = 2
set Scale = 1
set ScaleFactor = 1.0
set mintconia = 2.0
set ptDisQ = T
launch
```

HELAC-Onia Web - Results



HELAC-Onia Web - Results









HELAC-Onia Web - Run status and history

HELAC-Onia Web | Run status

nloaccess.in2p3.fr/HO/carlo.flore/account/run_status/

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HELAC-Onia Web - Carlo's runs

Run status

Run id(s) Remove run(s)

For removing multiple runs, separate the IDs with a comma or a semicolon.

Run ID	Date (dd/mm/yyyy)	Time (d+hh:mm:ss)	Idle	Running	Completed	Process
906	02/09/2019	14:46:30	0	1	6	p p > cc-(3s11) cc-(3s11) g

Refresh







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HELAC-Onia Web - Run status and history

HELAC-Onia Web | Run history

nloaccess.in2p3.fr/HO/carlo.flore/account/run_history/

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HELAC-Onia Web - Carlo's runs history

Run history

To retrieve your result, you can go to your personal OwnCloud folder.

Run ID	Date (dd/mm/yyyy)	Time	Running time (d+hh:mm:ss)	Process
905	03/08/2019	22:42:27	0+01:03:31	p p > cc-(3s11) cc-(3s11) g

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HELAC-Onia Web - User friendliness

User friendliness is a key concept:

- manage registration and run submission via simple procedures
- protected cloud storage is given
- plots are ready to be seen and downloaded
- no CPU cost for the user, just wait for mail updates and get back the results!

4. Conclusions

Conclusions

- NLOAccess:
 - aim to create a single portal for hadronic physics
 - automation and virtual access to a dynamical library
- HELAC-Onia: automated perturbative calculation for quarkonia production
- HELAC-Onia Web: improved portal is online

User feedback is important: improvements will come with your help too!

Thank you

Backup

What is STRONG-2020?

- approved for EU Horizon 2020 funding
- 32 Work Packages
- 44 institutions/16 countries
- 7 Transnational Infrastructures (COSY, MAMI, ELSA, GSI, LNF, CERN, ECT*)

HELAC-Onia Web: available PDF sets

The following PDF sets are available for the web version of HELAC-Onia:

- CT10
- CT14LO
- CT14NLO
- CTEQ6L1
- CTEQ66
- nCTEQFullNucMod_208_82
- EPPS16+CT14nlo_Pb208
- NNPDF3.0_NLO_as_0118

References

- HELAC-Onia:
 - “HELAC-Onia: an automatic matrix element generator for heavy quarkonium physics”, Hua-Sheng Shao, Comput. Phys. Commun. 184 (2013) 2562 (<https://doi.org/10.1016/j.cpc.2013.05.023>)
 - “HELAC-Onia 2.0: an upgraded matrix-element and event generator for heavy quarkonium physics”, Hua-Sheng Shao, Comput. Phys. Commun. 198 (2016) 238 (<https://doi.org/10.1016/j.cpc.2015.09.011>)
 - download at <http://hshao.web.cern.ch/hshao/helaconia.html>
- NLOAccess: <https://nloaccess.in2p3.fr>
- Flask: <http://flask.pocoo.org/>