

# Marek Schönherr

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ESR Oct 2011 - Sep 2012



Institute for Particle Physics Phenomenology  
Durham University



LHCphenonet midterm meeting  
19/09/2012

LHCphenonet



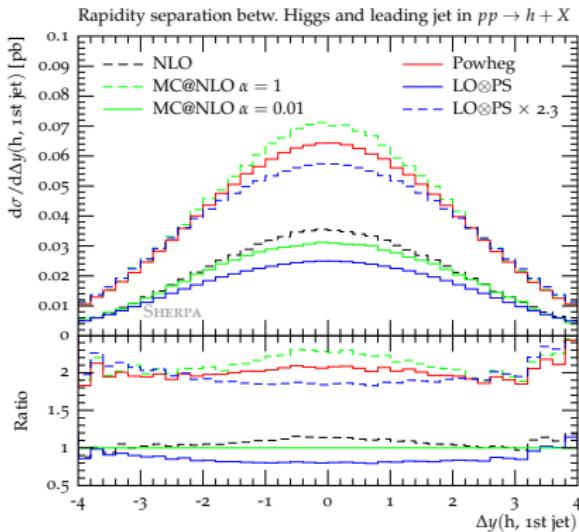
# Personal details

- 2001 - 2007 Technische Universität Dresden, Germany
  - Diploma in Physics (Dipl.-Phys.)
- 2005 - 2006 University of Canterbury, Christchurch, New Zealand
  - Postgraduate-diploma in Science
- Oct 2007 - Mar 2008 Research assistant in TU Dresden ATLAS group
- Apr 2008 - Sep 2011 PhD student in particle phenomenology group (supervisor Dominik Stöckinger), IKTP TU Dresden
  - PhD (Dr. rer. nat.)
  - May 2009 - Mar 2011 PhD Scholarship of the DFG Graduate College 1504
  - Oct 2008 - Jan 2009 Marie-Curie short-term ESR (MCnet) in Durham
  - Jun 2010 - Sep 2010 Marie-Curie short-term ESR (HEPTOOLS) in Durham

# Present status

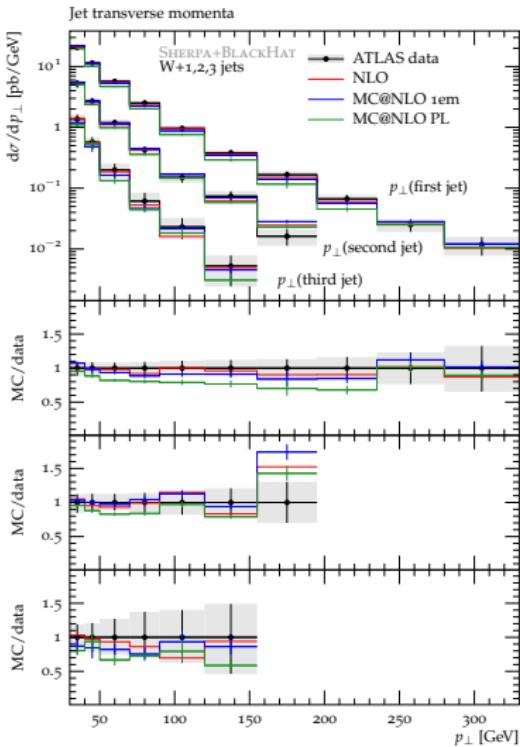
- Oct 2011 - Sep 2011 ESR at IPPP, Durham University  
supervisors: Daniel Maître, Thomas Gehrmann
- Oct 2012 local funding in Durham
- involved in work packages/milestones:
  - WP2: Discovery  
M2.1: "Fully differential distributions of Higgs-Boson cross sections"
  - WP3: Support to Experiments  
M3.4: "Consistent combination of fixed order calculations with resummed results in perturbation theory to improve the theoretical accuracy of general collider observables. Systematic improvement of QCD parton showers.  
Development of the Monte-Carlo event generator SHERPA."
- member of local organising committee of LHCphenonet meeting in Lumley Castle, Chester-le-Street, United Kingdom, 19-23 Mar 2012

# Deliverables/publications: LPN11-58 (M3.4), LPN12-007 (M2.1)



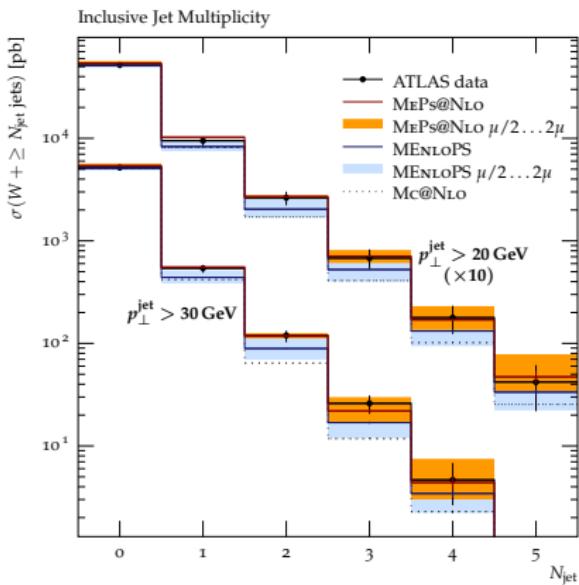
- appraisal of different algorithms for matching NLO calculations to parton showers and improvements thereupon
- application to dominant Higgs production process and assessment of effects/uncertainties
  - S. Höche, F. Krauss, M. Schönherr, F. Siegert, "A critical appraisal of NLO+PS matching methods", arXiv:1111.1220, LPN11-58
  - S. Dittmaier, et.al., "Handbook of LHC Higgs Cross Sections: 2. Differential Distributions", arXiv:1201.3084, LPN12-007

# Deliverables/publications: LPN12-026 (M3.4)



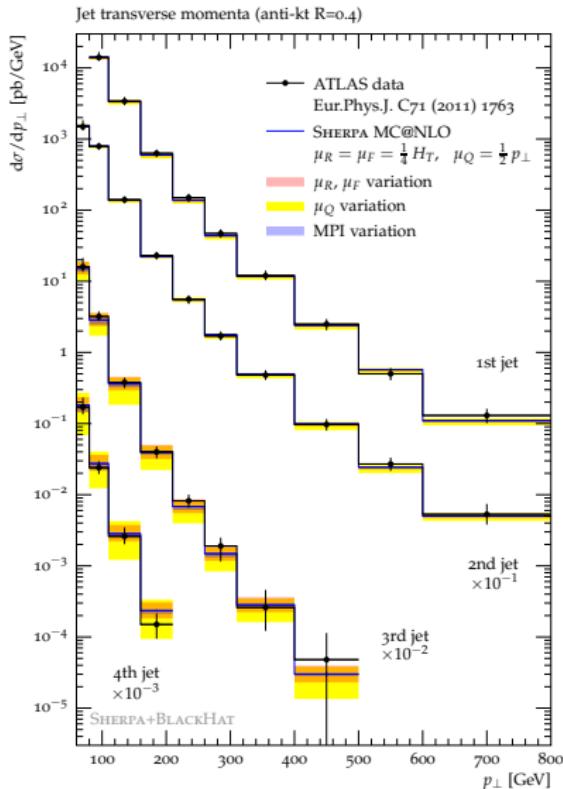
- description of  $pp \rightarrow W + n\text{jets}$  ( $n=0,1,2,3$ ) individually
- NLO accuracy of the respective jet multiplicity and resummation of softer radiation
- no resummation wrt. inclusive process
- S. Höche, F. Krauss, M. Schönherr, F. Siegert, "W+n-jet predictions with MC@NLO in Sherpa", arXiv:1201.5882, LPN12-026

# Deliverables/publications: LPN12-080, LPN12-081 (M3.4)



- inclusive description of  $pp \rightarrow W + \text{jets}$
- simultaneously describe  $W + 0, 1, 2$  jet final states at NLO,  $W + 3, 4$  jets at LO, and maintain overall logarithmic accuracy (resummation wrt. inclusive process)
  - S. Höche, F. Krauss, M. Schönherr, F. Siegert, "QCD matrix elements + parton showers: The NLO case", arXiv:1207.5031, LPN12-081
  - S. Höche, F. Krauss, M. Schönherr, F. Siegert, "NLO QCD matrix elements + parton showers in  $e^+e^- \rightarrow \text{hadrons}$ ", arXiv:1207.5031, LPN12-080

# Deliverables/publications: LPN12-090 (M3.4)



- evaluation of perturbative and non-perturbative uncertainties in inclusive jet production
- NLO accuracy for transverse momentum of first and second jet, LO accuracy for third jet, LL for fourth
  - S. Höche, M. Schönherr, "Uncertainties in NLO + parton shower matched simulations of inclusive jet and dijet production", arXiv:1208.2815, LPN12-090

# Deliverables/open source code: SHERPA

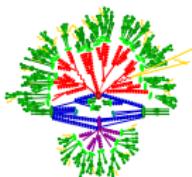
- SHERPA event generator framework is public code

<http://sherpa.hepforge.org>

⇒ able to calculate all aspects of typical collider event



- focusses on general and fully differential (process and observable independent) implementations
- heavily used both by experiments and theory community
- current version contains all of LPN11-58, LPN12-007, LPN12-026
- newly developed features LPN12-080, LPN12-081, LPN12-090 will be included in next major release



# Conference/workshop presentations

- M. Grazzini, H. Hoeth, F. Krauss, F. Petriello, M. Schönherr, F. Siegert, "Perturbative and non-perturbative uncertainties in NLO MCs", Fifth LHC Higgs Cross Section Workshop, 21-22 Nov 2011, Orsay, France
- S. Höche, F. Krauss, M. Schönherr, F. Siegert, "Improving MC@NLO simulations", NLO and parton showers workshop, 27-28 Feb 2012, CERN
- S. Höche, F. Krauss, M. Schönherr, F. Siegert, "NLO+PS matching methods and systematic uncertainties", Event generators and resummation workshop, 29 May-01 Jun 2012, DESY, Hamburg, Germany
- S. Höche, F. Krauss, M. Schönherr, F. Siegert, "Systematic uncertainties in NLO+PS matching", ICHEP, 04-11 Jul 2012, Melbourne, Australia
- S. Höche, F. Krauss, M. Schönherr, F. Siegert, "Recent developments in Sherpa", QCD@LHC, 20-24 Aug 2012, East Lansing, Michigan, USA
- S. Höche, F. Krauss, M. Schönherr, F. Siegert, "Parton shower matching and multijet merging at NLO", HP2, 04-07 Sep, Munich, Germany
- M. Schönherr, "Vector boson plus multijet production", TOP2012, 17-21 Sep, Winchester, United Kingdom
- M. Schönherr, "QED corrections in MCs", Workshop on electroweak corrections for LHC physics, 24-26 Sep, Durham, United Kingdom

# Seminars

- M. Schönherr, “A critical appraisal of NLO+PS matching methods”, 28 Mar 2012, University of Manchester, Manchester, United Kingdom
- M. Schönherr, “NLO+PS matching methods and associated uncertainties”, 15 Jun 2012, SLAC, Stanford, USA
- M. Schönherr, “QED corrections in SHERPA”, 30 Aug 2012, ATLAS Monte-Carlo Physics Group, Meeting on modeling QED radiation & higher order corrections, CERN