Report from the....

2nd International WHIZARD Forum

16 - 18 March 2015
Würzburg

- SM and BSM physics
- LHC, ILC, CLIC, FCC collider physics
- Matrix elements, models and effective theories
- QED/QCD/Weak Radiation and Merging
- Higher Orders: Automation and Interfacing
- User interfaces, computing and performance

Jenny List
DESY
25.3.2015

Overview

- ## 33 participants

  - ### 1/3 experimentalists (ATLAS, ILC, CLIC, CEPC)

  - ### 2/3 theorists

- ## 2 ½ days all plenary
  https://indico.desy.de/conferenceTimeTable.py?confId=10353#20150316

  - ### collider overview

  - ### NLO calculations & tools

  - ### Shower, Resummation, Matching and Merging

  - ### Beyond the SM

  - ### Beam description

  - ### Performance and event formats
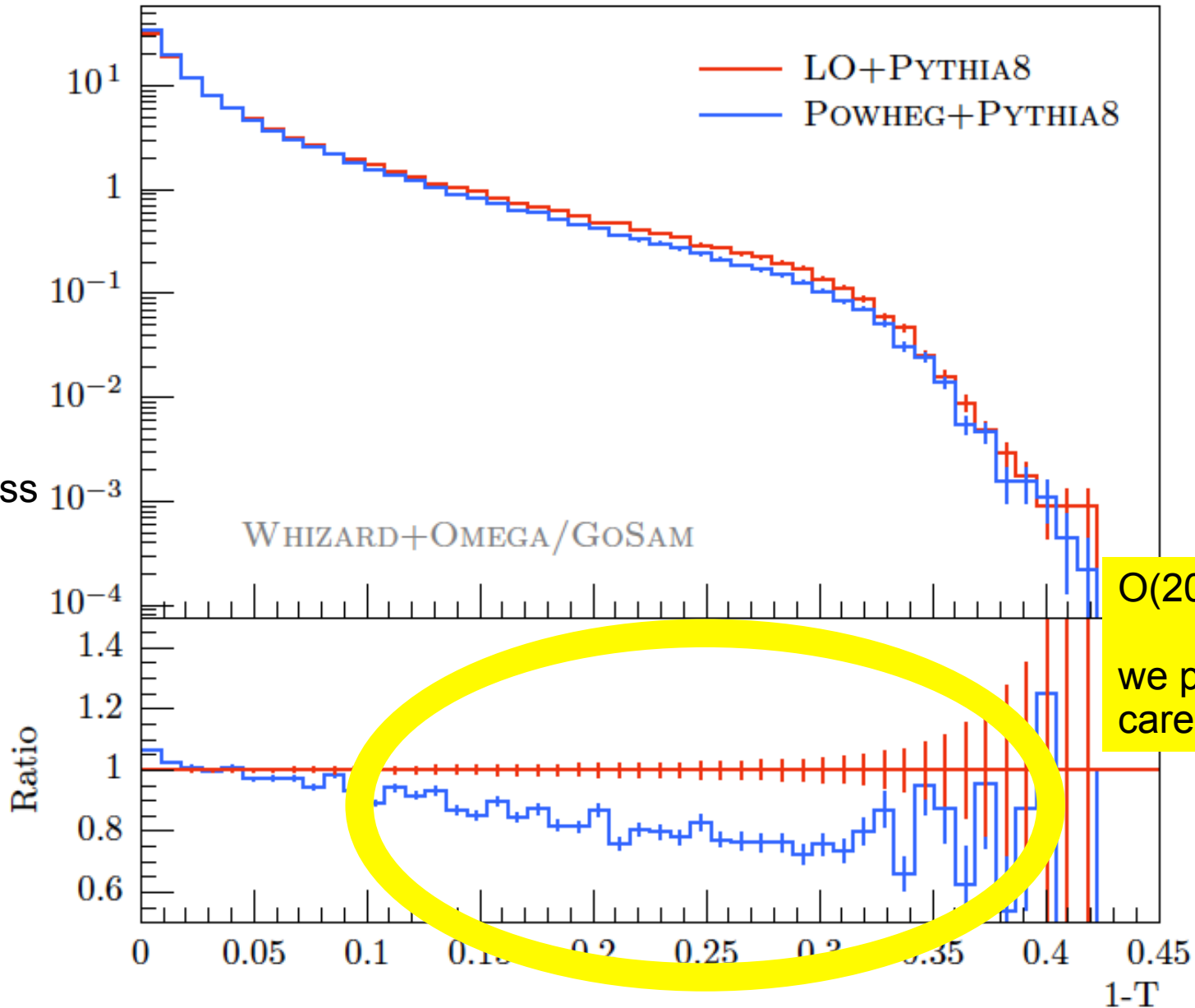
  - ### user feed-back / discussions

What is new in Whizard 2 ?

- Whizard goes NLO (QCD) -> very important multi-jet final states

  - NLO (EW), ISR/FSR matching: not yet, but planned

- top threshold: NLL NRQCD treatment

  - incl. matching between NLL @ threshold and NLO in continuum

- unitary bounds in vector boson scattering

- beam spectra: interface to GuineaPig

- interfaces to automatic tools for generating BSM Feynman rules (eg Sarah)

- improved integration etc: 2 -> 8 works now (ttH !)

- more technical:

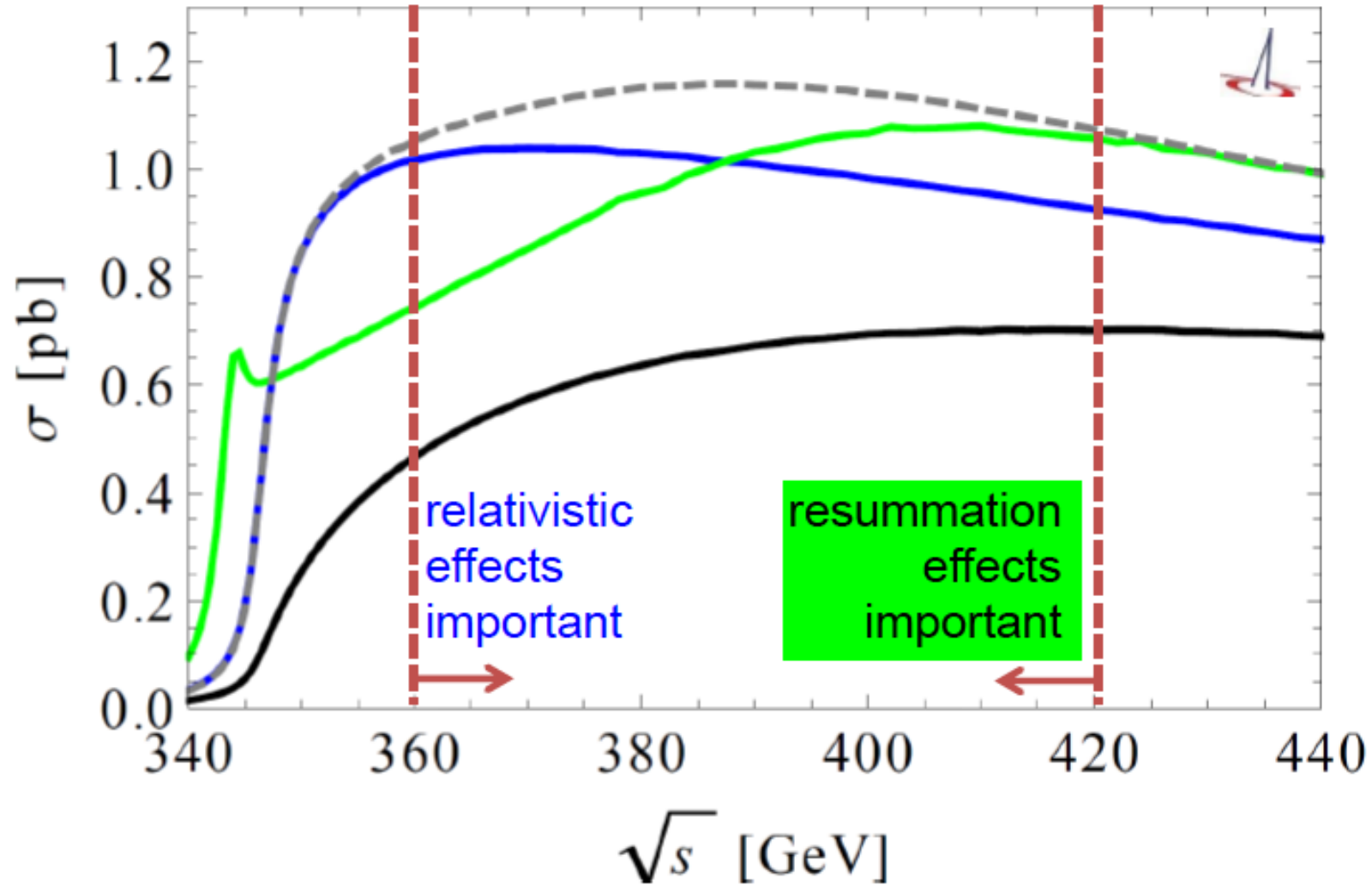 - high-level steering "language" SINDARIN

  - direct output to LCIO

$e^+ e^- \rightarrow u\bar{u}$ at NLO matched to Parton Shower

WHIZARD now has its **own implementation of the POWHEG method**

Christian Weiss

O(20%) effects

we probably care about this?!

Matching Top threshold and continuum

relativistic effects important

resummation effects important

Fabian Bach

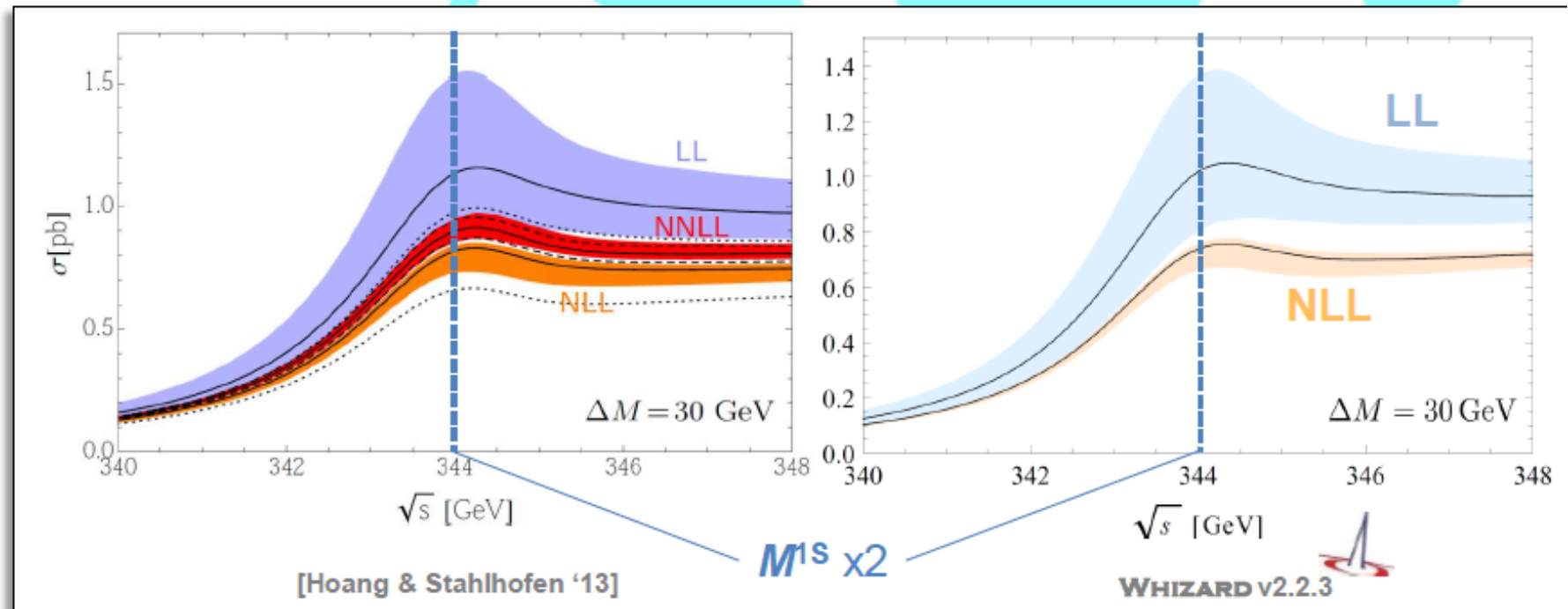# NLL NRQCD @ ttbar threshold
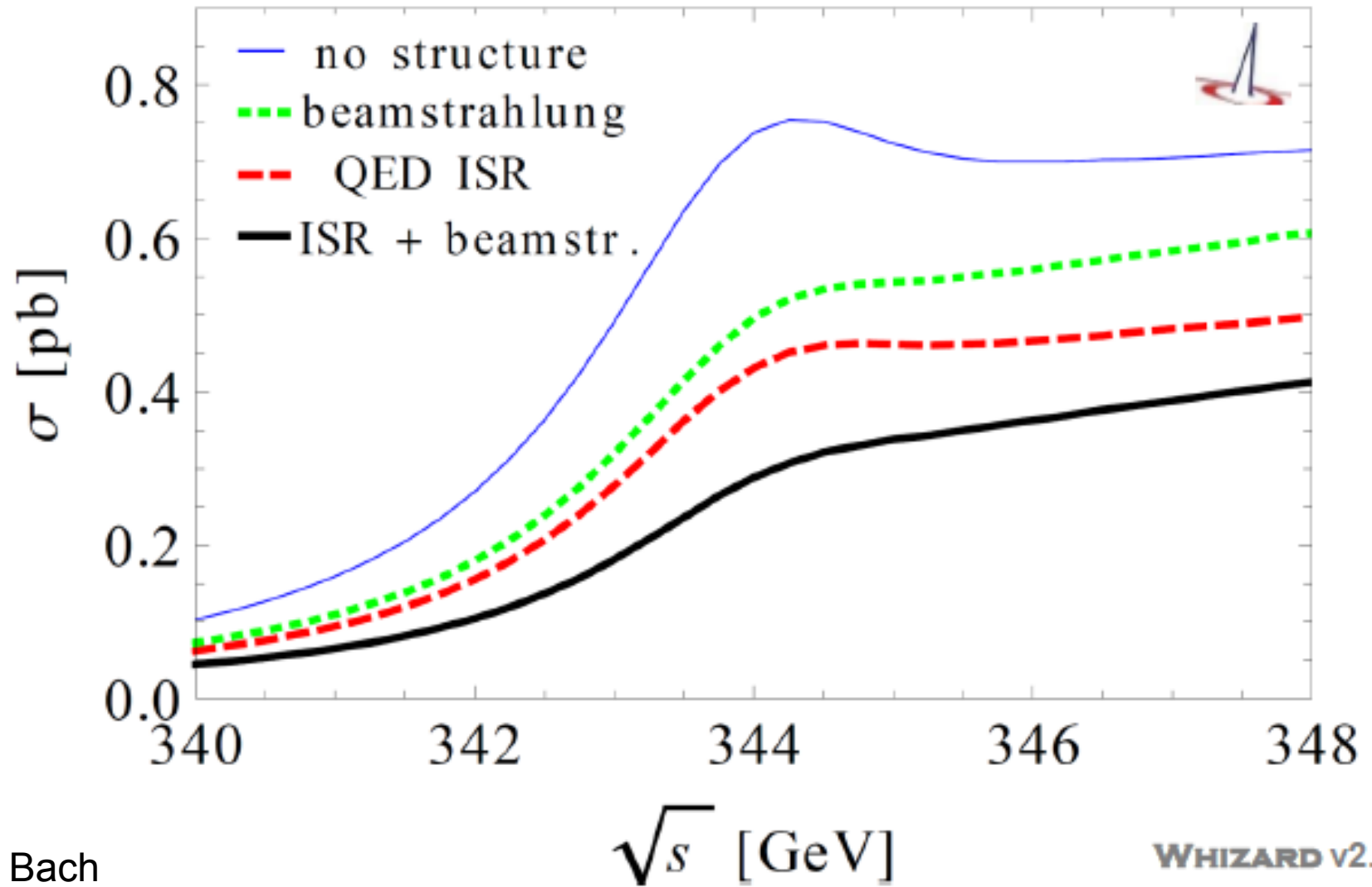
WHIZARD ttbar threshold implementation (v2.2.3 release)

> compare **WHIZARD** implementation with NRQCD calculation

> **LL/NLL** *ttV* form factor implemented using **TOPPIK** [Hoang & Teubner '99]

> default parameters: M^{1S} = 172 GeV, Γ_t = 1.54 GeV, $\alpha_s(m_Z)$ = 0.118

Fabian Bach

$$M^{1S} = m_t^{pole}\left(1 - \Delta^{LL/NLL}\right)$$

~ Coulomb potential

$\Delta M = 30$ GeV

[Hoang & Stahlhofen '13]

M^{1S} x2

WHIZARD v2.2.3

6

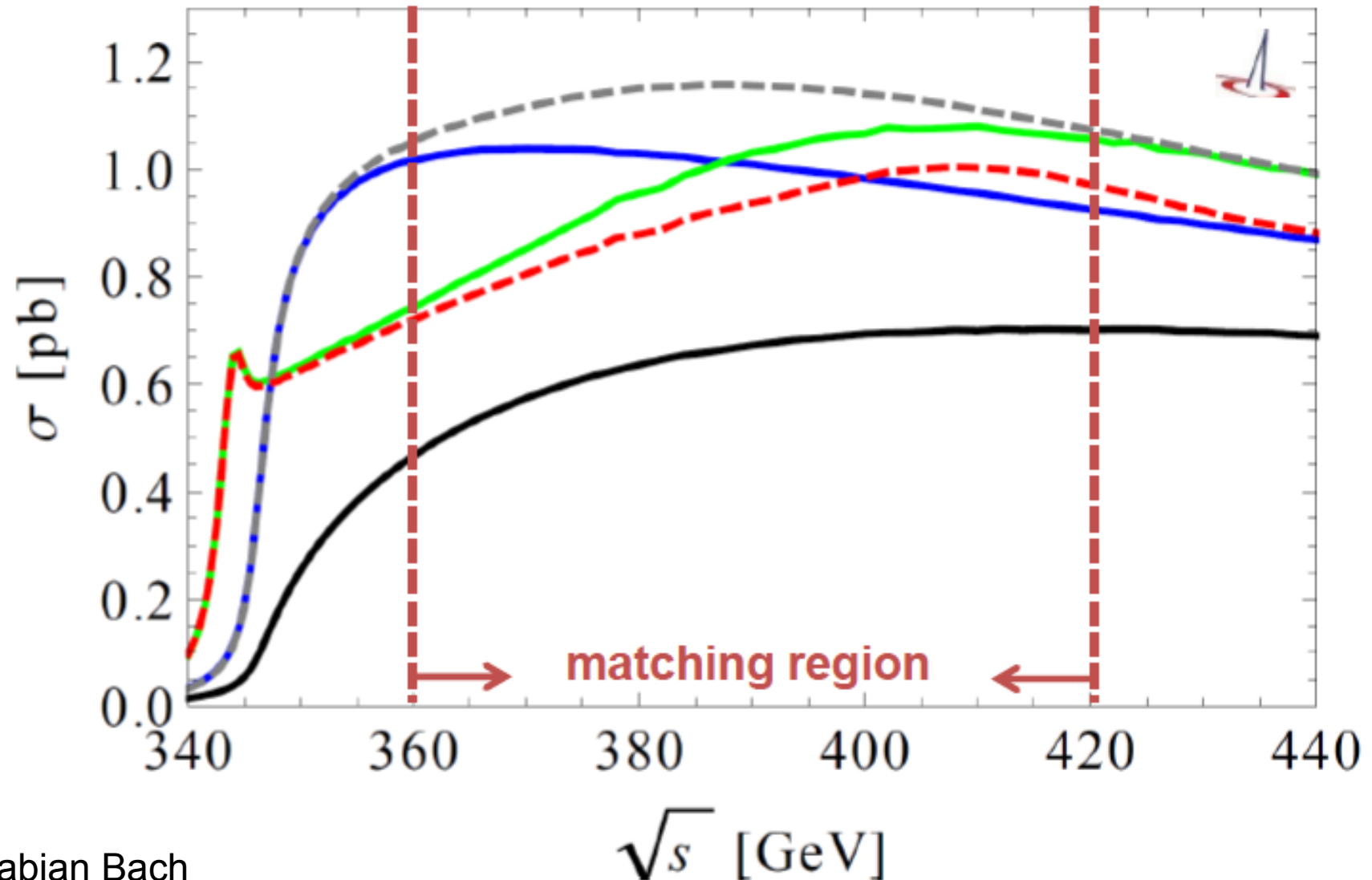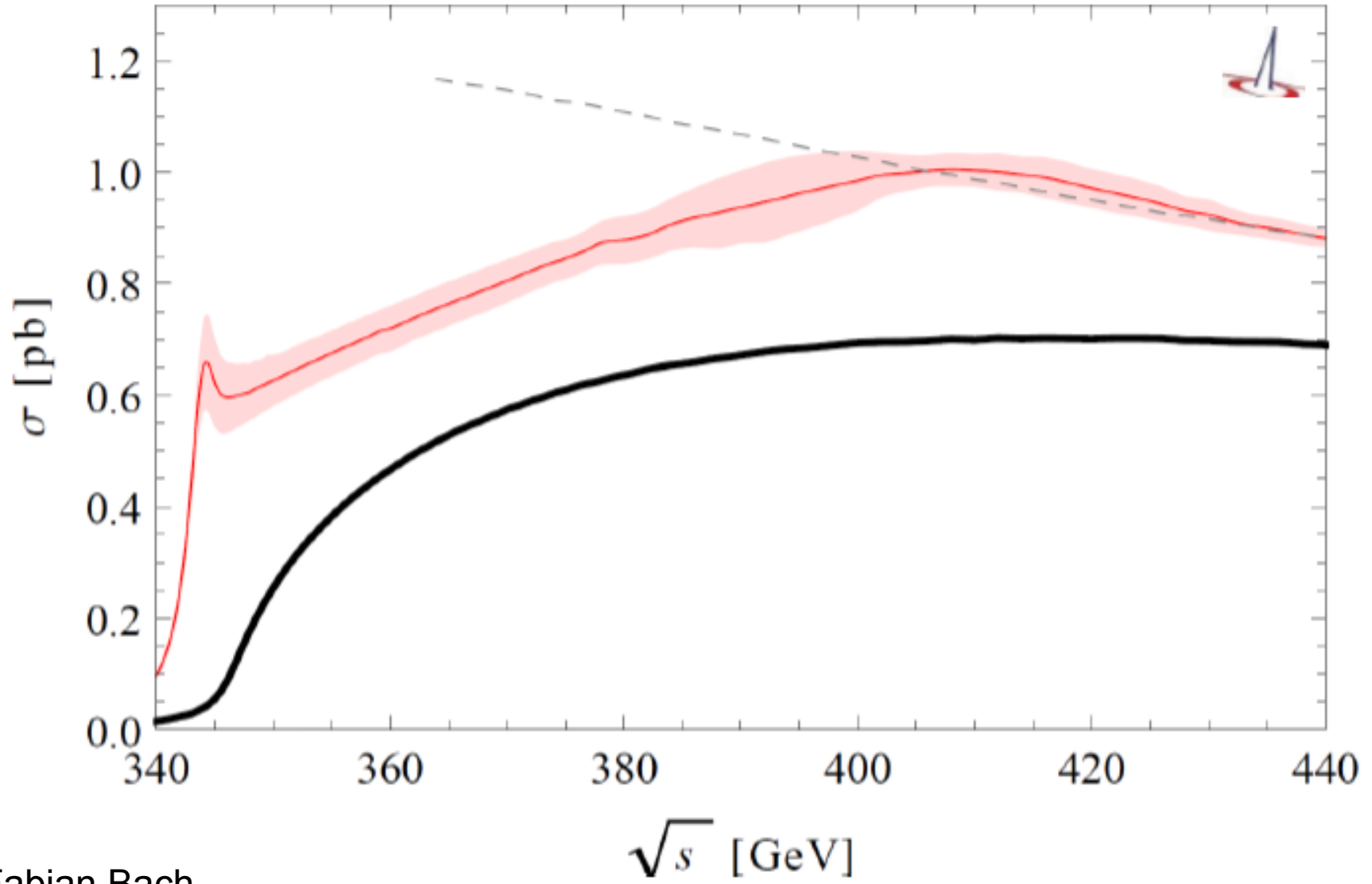# NLL NRQCD @ ttbar threshold

Fabian Bach

Matching Top threshold and continuum

Fabian Bach

Matching Top threshold and continuum

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Linear Collider & Whizard

- Working horse for ILC and CLIC up to now:
  ILCWhizard based on Whizard 1.9x + Pythia 6.x + Tauola

- CLIC decided to switch to Whizard 2 within this year

- LC Generators Group started to prepare transition

  - new beam spectrum interface tested (M. Habermehl, WIMP analysis)

  - fragmentation with OPAL tune works

  - τ-decays: Tauola interface to be done

  - NLO, matching etc: not yet looked at

- Generator group plans to meet at ALCW