

TOOLS08

Report of Contributions

Contribution ID: 0

Type: **not specified**

Overview talk: Introduction to the conference

Monday, 30 June 2008 11:30 (1 hour)

Presenter: PESKIN, Michael (SLAC)

Session Classification: Session 2

TOOLS08

/ Report of Contributions

TBA

Contribution ID: 1

Type: **not specified**

TBA

Presenter: POROD, Werner Rudolf (Uni Zurich)

Contribution ID: 2

Type: **not specified**

Parameter estimation with Markov Chain Monte Carlo techniques

Monday, 30 June 2008 12:30 (30 minutes)

In the field of cosmology, the analysis of observational data with Bayesian methods is wide-spread. Only fairly recently it was suggested to apply these methods also to particle physics, to constrain the free parameters of supersymmetric models such as the CMSSM. The technical challenge of these analyses lies in the need to accurately sample a multi-dimensional parameter space in a reasonable amount of time. Markov Chain Monte Carlo (MCMC) algorithms offer an elegant solution to this problem. I will give a brief introduction to the theory of MCMC and illustrate its applications with a few examples from the recent literature.

Presenter: HAMANN, Jan (Unknown)

Session Classification: Session 2

Contribution ID: 3

Type: **not specified**

Development of CalcHEP program

Monday, 30 June 2008 14:30 (30 minutes)

Talk present recent development of CalcHEP program for automatic calculation of matrix elements, integration over phase space and event generation.

Presenter: PUKHOV, Alexander

Session Classification: Session 3

Contribution ID: 4

Type: **not specified**

Collider phenomenology of minimal walking technicolor

Monday, 30 June 2008 15:05 (20 minutes)

I present collider phenomenology and LHC signatures of the (Next to) Minimal Walking Technicolor models. The study is based on our implementation of the models into CalcHeP. I will also comment on work in progress implementing the model in Sherpa.

Presenter: FRANDSEN, Mads Toudal (Unknown)

Session Classification: Session 3

Contribution ID: 5

Type: **not specified**

FeynRules - Feynman rules made easy

Monday, 30 June 2008 16:00 (20 minutes)

The hunt for new physics at the LHC will bring up new challenges on both the theoretical and experimental side. Many tools, symbolical and numerical, are available nowadays to facilitate the communication between theorists and experimentalists involved in this hunt. However, the implementation of new physics models into the existing tools is a rather tedious work. I present a new tool called FeynRules, a Mathematica package to derive Feynman rules directly from a lagrangian. I will review the main features of the code and the algorithm, and in particular how the package can be interfaced to other existing tools for phenomenological studies

Presenter: DUHR, Claude (UCL)

Session Classification: Session 4

Contribution ID: 6

Type: **not specified**

BSM phenomenology with FeynRules

Monday, 30 June 2008 16:25 (30 minutes)

As the LHC turns on, and our theoretical models prepare to confront data, we need to be prepared to implement various models in monte carlo event generators for comparison. There is a large number of monte carlo generators on the market including CalcHEP/CompHEP, MadGraph, Sherpa, Herwig, Whizard and others. Each of these tools has different strengths and weaknesses and so it would be ideal if we could use each tool for the job it is best suited. In the recent past implementing a new model in just one of these event generators was a tedious and error prone task, in many cases requiring programming skills. Furthermore, once you finished building a model in one monte carlo package, it was not transferable to another and you had to start nearly from scratch. FeynRules is a Mathematica package which aims to overcome this challenge. The user of FeynRules implements a model in the FeynRules format. The lagrangian can be written in Mathematica notation in a form that is “close” to the way you write the lagrangian on paper. FeynRules then reads this FeynRules model-file, creates the Feynman rules and stores the information in a monte carlo program independent format. This information is then general enough to be used by any monte carlo package as well as symbolic packages and TeX. All that is necessary is a translation to the respective language. Such translation interfaces have been written for TeX, FeynArts, MadGraph, Sherpa, and CalcHEP/CompHEP. We hope to add interfaces to other monte carlos in the future.

Presenter: CHRISTENSEN, Neil**Session Classification:** Session 4

Contribution ID: 7

Type: **not specified**

Tutorial 1: LanHEP

Monday, 30 June 2008 17:00 (1 hour)

The LanHEP program for Feynman rules generation is presented. It reads the Lagrangian written in the compact form close to one used in publications. It means that Lagrangian terms can be written with summation over indices of broken symmetries and using special symbols for complicated expressions, such as covariant derivative and strength tensor for gauge fields. The output is Feynman rules in terms of physical fields and independent parameters. This output can be written in LaTeX format and in the form of CompHEP model files, which allows one to start calculations of processes in the new physical model. Feynarts format output is also available now.

Presenter: SEMENOV, Andrey (JINR)

Session Classification: Session 4

Contribution ID: 8

Type: **not specified**

Overview talk: Experimental usage, needs and issues

Tuesday, 1 July 2008 09:00 (1 hour)

Presenter: BROOIJMANS, Gustaaf (Columbia University)

Session Classification: Session 1

Contribution ID: 9

Type: **not specified**

BSM physics in Herwig++

Tuesday, 1 July 2008 10:05 (30 minutes)

I will describe the Beyond the Standard Model physics implemented in the Herwig++ generator including the automatic generation of the hard process, two- and three-body decays and our treatment of off-shell effects.

Presenter: Dr RICHARDSON, Peter (Durham University)

Session Classification: Session 1

Contribution ID: 10

Type: **not specified**

SusyBSG: a fortran code for BR[B->Xs gamma] in the MSSM with minimal flavor violation

Tuesday, 1 July 2008 11:10 (20 minutes)

We present the fortran code SusyBSG version 1.1, which computes the branching ratio for the decay $B \rightarrow Xs \gamma$ in the MSSM with Minimal Flavor Violation. The computation takes into account all the available NLO contributions, including the complete supersymmetric QCD corrections to the Wilson coefficients of the magnetic and chromomagnetic operators.

Presenter: SLAVICH, Pietro (Unknown)

Session Classification: Session 2

Contribution ID: 11

Type: **not specified**

SuperIso and flavor constraints on supersymmetric models

Tuesday, 1 July 2008 11:35 (20 minutes)

SuperIso is a program dedicated to indirect constraint calculations in the MSSM, and in particular those associated to $b \rightarrow s \gamma$ transitions, providing for example the isospin asymmetry associated to these transitions at NLO accuracy and the branching ratio at NNLO. In this talk, I will present the most important features and the new developments of SuperIso, as well as some of the resulting constraints.

Presenter: Dr MAHMOUDI, Farvah Nazila (Mount Allison University)

Session Classification: Session 2

Contribution ID: 12

Type: **not specified**

HiggsBounds: confronting models with an arbitrary number of neutral Higgs bosons with LEP & Tevatron results

Tuesday, 1 July 2008 12:00 (30 minutes)

From the Higgs search at LEP and the Tevatron, limits on topological cross sections, which can be applied to a large class of models, have been derived or, in the case of the Tevatron, are still updated. Developed in collaboration with P. Bechtle, S. Heinemeyer, G. Weiglein, K. Williams, our code can decide for models with an arbitrary number of neutral Higgs bosons, with given deviations from the Standard Model Higgs production cross sections and decay branching ratios, whether it is excluded at the 95% C.L. or not. This is a very useful tool for phenomenologists and model builders alike, allowing on the one hand to have easy access to up-to-date parameter restrictions, e.g. for the MSSM, and on the other hand to confront new models of the Higgs sector with detailed constraints. There is a FORTRAN version of the code, useful to obtain individual plots or model parameter scans, and an on-line version which is currently being set up. For the MSSM we also provide interfaces to the spectrum calculators FeynHiggs and CPsuperH.

Presenter: Dr BREIN, Oliver (IPPP, Durham)

Session Classification: Session 2

Contribution ID: 13

Type: **not specified**

A framework for consistent combination of indirect constraints on the MSSM

Tuesday, 1 July 2008 12:35 (20 minutes)

Already today, low-energy data from flavour physics experiments, high precision electroweak observables as well as astrophysical data impose strong constraints on many new physics (NP) scenarios. In order to quantify the agreement of a particular NP model with the existing experimental measurements, a consistent set of theory predictions has to be provided. A common “MasterCode” to combine the different calculations has been set up by a collaboration of experimentalists and theorists from various fields. This package integrates state-of-the-art calculations of low-energy physics, electroweak and astroparticle observables in the minimal supersymmetric standard model (MSSM). It was recently updated to accommodate different constrained versions of the MSSM, while the list of flavour physics observables was significantly enlarged. Using this tool, we carry out multidimensional χ^2 scans of the MSSM parameter space based on Markov Chain Monte Carlo. The results of this study indicate that already today’s experimental data allows to place tight constraints on the MSSM. Furthermore, we evaluate the importance of several observables by investigating how the deviation from the Standard Model expectation and the uncertainty of the experimental measurement influence the allowed MSSM parameter space. In this talk we present the results of the above studies and outline the design and usage of the “MasterCode”.

Presenter: Dr FLAECHEER, Henning (Royal Holloway, University of London)

Session Classification: Session 2

Contribution ID: 14

Type: **not specified**

BSM with CompHEP

Tuesday, 1 July 2008 15:00 (20 minutes)

New options of the CompHEP package for computing and simulating processes in models beyond SM are discussed.

Presenter: BOOS, Eduard (Institute for Nuclear Physics)

Session Classification: Session 3

Contribution ID: 15

Type: **not specified**

Study of spin correlations with FORM version of CompHEP

We demonstrate a new algorithms for calculation cascade processes with taking in to account a spin correlations.

Presenter: BUNICHEV, Viacheslav

Contribution ID: 16

Type: **not specified**

Tutorial 2: Madgraph

Wednesday, 2 July 2008 14:30 (1 hour)

Presenter: MALTONI, Fabio (Unknown)

Session Classification: Session 3

Contribution ID: 17

Type: **not specified**

Neutrinos: Results and Future

Tuesday, 1 July 2008 17:15 (1 hour)

We will review what has been learned about neutrino mass and mixing, including the latest results. We will then discuss some of the major open neutrino questions, explaining why they are interesting, and describing strategies for answering them through future experiments. The question of whether neutrinos are their own antiparticles, and the related search for neutrinoless double beta decay, will receive heavy emphasis.

Presenter: KAYSER, Boris**Session Classification:** Colloquium

Contribution ID: **18**

Type: **not specified**

Overview talk: Backgrounds and SM Tools at the LHC

Wednesday, 2 July 2008 09:00 (1 hour)

Presenter: KRAEMER, Michael (Particle Physics)

Session Classification: Session 1

Contribution ID: 19

Type: **not specified**

MC for BSM with Pythia 8

Wednesday, 2 July 2008 10:05 (20 minutes)

This presentation will give a status report of the BSM processes available in Pythia 8. The features most relevant for BSM physics are summarized and a graviton study will be discussed as an example of how a so-called semi-internal process can be used to implement a new BSM process.

Presenter: ASK, Stefan (European Organization for Nuclear Research (CERN))

Session Classification: Session 1

Contribution ID: 20

Type: **not specified**

Status and new features of the event generator WHIZARD

Wednesday, 2 July 2008 11:00 (30 minutes)

We give a status report on the new WHIZARD version 2.0.0, along with a tutorial on the installation and usage of the program. The WHIZARD event generator is a multi-purpose event generator for multi-particle reactions at future colliders, especially for the LHC. We review both technical details of the most recent version and show its versatility with an overview over the most recent applications of the program.

Presenter: Prof. REUTER, Juergen (University of Freiburg)

Session Classification: Session 2

Contribution ID: 21

Type: **not specified**

NLO event generation for chargino production at the ILC

Wednesday, 2 July 2008 11:35 (20 minutes)

We present an extension of the Monte Carlo Event Generator Whizard which includes chargino production at the ILC at NLO. We include photons using both a fixed order and a resummation approach. While the fixed order approach suffers from negative event weights, the resummation method solves this problem and automatically includes leading higher order corrections. We present results for cross sections and event generation for both methods and evaluate the systematic errors due to soft and collinear approximations. In the resummation approach, the residual uncertainty can be brought down to the per-mil level.

Presenter: Dr ROBENS, Tania (RWTH Aachen, Institut fuer Theoretische Physik E)

Session Classification: Session 2

Contribution ID: 23

Type: **not specified**

Round table: Colliders

Wednesday, 2 July 2008 12:00 (1 hour)

Session Classification: Session 2

Contribution ID: 24

Type: **not specified**

The OPP method - towards NLO automation

Tuesday, 1 July 2008 14:30 (30 minutes)

I will briefly review the OPP method for the reduction of one loop amplitudes at the integrand level. As a first application the full NLO corrections to tri-boson production at the LHC will be presented, based on CuTTools and HELAC-PHEGAS matrix element generator. Finally I will discuss the different strategies towards an automatic generator at the NLO level.

Presenter: PAPADOPOULOS, Costas (Institute of Nuclear Physics)

Session Classification: Session 3

Contribution ID: 25

Type: **not specified**

Automatic calculation of one loop amplitudes

We present our recent work on automated calculation of one loop QCD amplitudes. We will demonstrate the algorithm and our integration techniques for the one loop.

Presenter: DRAGGIOTIS, Petros

Contribution ID: 26

Type: **not specified**

BSM physics with Sherpa

Wednesday, 2 July 2008 16:00 (20 minutes)

I will review the capabilities of the Sherpa Monte Carlo generator for simulating beyond the Standard Model physics. Special emphasis will be given to the newly developed interface to the FeynRules packages. This allows to input model parameters and interaction vertices, needed for matrix element calculations, in a very simple way.

Presenter: SCHUMANN, Steffen

Session Classification: Session 4

Contribution ID: 27

Type: **not specified**

Weighting di-boson Monte Carlo events in hadron colliders

Wednesday, 2 July 2008 16:30 (20 minutes)

A detailed study of the di-boson Monte Carlo programs Pythia, MC@NLO and the program of Baur, Han and Ohnemus (BHO) is performed. None of these programs cover all aspects of di-boson production. The BHO code is used to produce event weights emulating anomalous triple gauge couplings in Pythia and MC@NLO events. In the same way, boson spin information which is missing for most di-boson channels in MC@NLO can be introduced as well. This weighting code can be used to study systematic effects related to various aspects of the Monte Carlo generators, e.g. parton distribution functions. A detailed study comparing distributions of event samples generated with these three generators shows a nice agreement for events without jets. Some differences between the three samples are observed for events with jets. Most of these differences can be attributed to the different ways of jet production in the three programs.

Presenter: BELLA, Gideon (High Energy Physics Department)

Session Classification: Session 4

Contribution ID: 28

Type: **not specified**

Tutorial 3: Sherpa

Wednesday, 2 July 2008 17:00 (1 hour)

Presenter: KRAUSS, frank (Durham University)

Session Classification: Session 4

Contribution ID: **30**

Type: **not specified**

Overview talk: Dark Matter

Thursday, 3 July 2008 09:00 (1 hour)

Presenter: GONDOLO, Paolo

Session Classification: Session 1

Contribution ID: **31**Type: **not specified**

DarkSUSY 5.0

Thursday, 3 July 2008 11:00 (30 minutes)

DarkSUSY is a program package to perform calculations of relic density and various signals for direct and indirect searches, especially for supersymmetric dark matter. The new release of DarkSUSY with many improvements will be released and discussed.

Presenter: EDSJO, Joakim**Session Classification:** Session 2

Contribution ID: 32

Type: **not specified**

Dark-matter tools

Thursday, 3 July 2008 10:05 (20 minutes)

Presenter: DONATO, Fiorenza

Session Classification: Session 1

Contribution ID: 33

Type: **not specified**

Direct detection module in micrOMEGAs program

Thursday, 3 July 2008 11:35 (20 minutes)

Presenter: PUKHOV, Alexander

Session Classification: Session 2

Contribution ID: **34**

Type: **not specified**

Round table: DM

Thursday, 3 July 2008 12:00 (1 hour)

Session Classification: Session 2

Contribution ID: 35

Type: **not specified**

FeynHiggs: the swiss army knife for MSSM Higgs physics

Friday, 4 July 2008 11:00 (30 minutes)

Presenter: HEINEMEYER, Sven (CERN)

Session Classification: Session 2

Contribution ID: 36

Type: **not specified**

Benchmarking the NMSSM with NMSSMTools

Thursday, 3 July 2008 16:20 (30 minutes)

I'll present the latest version of NMSSMTools, a package that computes the NMSSM sparticle and Higgs spectrum and checks all available experimental as well as theoretical constraints.

Presenter: HUGONIE, Cyril

Session Classification: Session 4

Contribution ID: 37

Type: **not specified**

POLXINO: Neutralino, chargino, and gluino two-loop pole mass calculator

Thursday, 3 July 2008 16:00 (20 minutes)

POLXINO is a C-program for the numerical evaluation of the pole masses of neutralinos, charginos and the gluino in the MSSM with the full set of complex input parameters. The renormalization is performed in the DR-bar' scheme as proposed in the SPA convention. Up to now it contains the full one-loop level and the two-loop SUSY-QCD as well the leading two-loop Yukawa coupling corrections. Currently, it is the only publicly available program for the calculation of even the one-loop chargino and neutralino pole masses with complex parameters. For the calculation of the two-loop self-energy integrals it uses the TSIL library. For convenience, it provides also an SLHA-interface.

Presenter: EBERL, Helmut**Session Classification:** Session 4

Contribution ID: 38

Type: **not specified**

Developing tools for Galactic Cosmic Ray transport: Dark Matter Annihilation in the light of EGRET, HEAT, WMAP, INTEGRAL and ROSAT

Thursday, 3 July 2008 14:30 (20 minutes)

The excess of diffuse galactic gamma rays above 1 GeV, as observed by the EGRET telescope on the NASA Compton Gamma Ray Observatory, shows all the key features from Dark Matter (DM) annihilation: 1) the energy spectrum of the excess is the same in all sky directions and is consistent with the gamma rays expected for the annihilation of WIMPs with a mass between 50-100 GeV; 2) the intensity distribution of the excess in the sky is used to determine the halo profile, which was found to correspond to the usual profile from N-body simulations with additional substructure in the form of two doughnut-shaped structures at radii of 4 and 13 kpc; 3) recent N-body simulations of the tidal disruption of the Canis Major dwarf galaxy show that it is a perfect progenitor of the ringlike Monoceros tidal stream of stars at 13 kpc with ring parameters in excellent agreement with the EGRET data; 4) the mass of the outer ring is so large, that its gravitational effects influence both the gas flaring and the rotation curve of the Milky Way. Both effects are clearly observed in agreement with the DMA interpretation of the EGRET excess; Although the EGRET excess of gamma rays provides an intriguing hint for DMA, its connection to the search for signals in antimatter particles is hampered by the propagation model uncertainties, which determine the local fluxes of charged species for a given source distribution. There are two main tools in order to determine the local and interstellar fluxes of Cosmic Rays: DarkSUSY, using a simple, but fast analytical approach and GALPROP, which solves the transport equation for Cosmic Rays numerically. In the standard propagation models there is no preferred propagation direction. In such models the Galaxy acts as a large storage box for charged particles, thus leading to a strong enhancement of the particle fluxes from the halo. However, present data from INTEGRAL and ROSAT strongly suggest that convection dominates over diffusion at low energies and in the source region, implying that particles produced by DMA in the halo have little probability to arrive at the detector. We present an anisotropic convection-dominated model for Cosmic Ray transport and show that the EGRET gamma ray excess, the HEAT positron excess, the INTEGRAL positron annihilation signal, the PAMELA antiproton fluxes and the WMAP-haze are consistent with each other in such models.

Presenter: GEBAUER, Iris (Universitaet Karlsruhe)

Session Classification: Session 3

Contribution ID: **39**

Type: **not specified**

Tutorial 4: Marmoset

Thursday, 3 July 2008 17:00 (1 hour)

Presenter: SCHUSTER, Philip (SLAC)

Session Classification: Session 4

Contribution ID: 41

Type: **not specified**

Overview talk: BSM Physics

Friday, 4 July 2008 09:00 (1 hour)

Presenter: OHL, Thorsten

Session Classification: Session 1

Contribution ID: 42

Type: **not specified**

Automatic calculation of SUSY particle production and decay with GRACE/SUSY-loop

Friday, 4 July 2008 10:05 (20 minutes)

We present results of the investigation on production and decay of neutralino with the automatic calculation system, GRACE/SUSY-loop.

Presenter: JIMBO, Masato

Session Classification: Session 1

Contribution ID: 43

Type: **not specified**

Bayesian inference for supersymmetric parameter constraints

Friday, 4 July 2008 11:35 (30 minutes)

I will present an up-to-date analysis of the Constrained MSSM, performed using Bayesian inference techniques to perform a global scan of the relevant parameter space. This allows for the first time to derive constraints accounting for all sources of uncertainties and all relevant data, from accelerator bounds to cosmological and astrophysical observations, including direct and indirect detection methods. I will discuss prospects of direct dark matter detection and forecasts for the most probable regions for the neutralino scattering cross sections, showing that a direct detection is feasible with the next generation of dark matter searches. The complementarity of direct searches to collider experiments will be highlighted, and prospects for indirect detection using gamma rays and positron annihilation signatures will be presented. A new publicly available code (see superbayes.org) for a Bayesian analysis of SUSY models will be presented and illustrated with a demo.

Presenter: TROTTA, Roberto

Session Classification: Session 2

Contribution ID: 44

Type: **not specified**

SFitter: a tool to determine model parameters from observables

Friday, 4 July 2008 12:10 (20 minutes)

If physics beyond the standard model are discovered, an important goal will be to determine the fundamental parameters of the underlying model from numerous highly correlated observables in a rigorous treatment of the experimental as well as the theoretical errors. SFitter provides a comprehensive bottom-up approach by combining tools to fit models to collider observables and indirect constraints. Several minimization techniques can be used to reconstruct the best parameter set and estimate the errors on its determination. We present the features of SFitter and illustrate its techniques in several supersymmetric scenarios.

Presenter: TURLAY, Emmanuel (LAL Orsay)

Session Classification: Session 2

Contribution ID: 45

Type: **not specified**

A dark matter tool on the web

Thursday, 3 July 2008 14:55 (30 minutes)

Evidences for Dark Matter existence have been increasingly compelling. Current and future direct and indirect searches and results from LHC will provide a wealth of new constraints on the nature of Dark Matter. A web page initiated by the ILIAS network has been set-up to provide the community with a developing tool to evaluate the sensitivities and complementarities of different experiments under different assumptions, theoretical and experimental. The status of this tool will be presented and examples of analysis shown.

Presenter: Dr LEMRANI, Rachid (CEA/DAPNIA/SPP)

Session Classification: Session 3

Contribution ID: 46

Type: **not specified**

Summary

Friday, 4 July 2008 12:35 (30 minutes)

Presenter: KATSANEVAS, Stavros (CNRS/IN2P3)

Session Classification: Session 2

Contribution ID: 47

Type: **not specified**

Welcome

Monday, 30 June 2008 11:15 (15 minutes)

Session Classification: Session 2