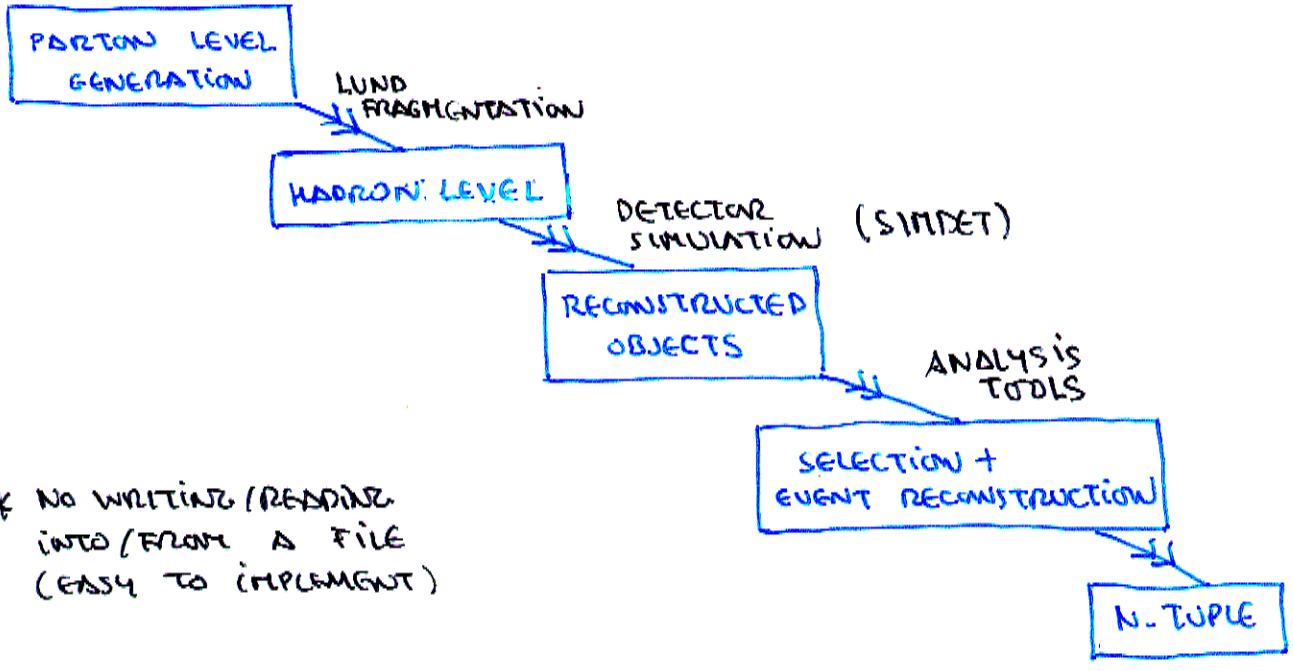
12/15/99

A. JUSTE

# SOFTWARE FOR LC STUDIES

- NEVER INTENDED TO BECOME A PUBLIC TOOL ...
- FRAMEWORK DEVELOPED IN THE EARLY DAYS OF SIMDET.
- PHYLOSOPHY VERY MUCH DRIVEN BY
  - COMPUTER LIMITATIONS : CPU / DISK
  - SOME ANALYSES (e.g. MEASUREMENT OF $\vartheta_{ttH}$) REQUIRE THE GENERATION OF MILLIONS OF EVENTS
    ⇒ WOULD LIKE TO PERFORM PRESELECTION ON THE FLY
  - ECONOMY IN DEVELOPMENT OF TOOLS ⇒ WOULD LIKE TO USE LUND TOOLS : JET-CLUSTERING, EVENT-SHAPE VARIABLES ...

⇒ ONE SHOT PHYLOSOPHY




* NO WRITING / READING INTO / FROM A FILE (EASY TO IMPLEMENT)

# PROGRAM STRUCTURE

| | | |
|---|---|---|
| READ USER DATACARDS | SELECT PROCESS, $\sqrt{s}$, ISR/BS ... | SUBROUTINE READCARDS |
| USER INITIALIZATION | DEFINE N-TUPLE VARIABLES... | SUBROUTINE USINIT |
| PARTON LEVEL GENERATION + LUND FRAGM. | . SOME PYTHIA / HERWIG PROCESSES<br>. TOPPIKE ($t\bar{t}$ @ threshold)<br>. THROUGH MADGRAPH ME : $t\bar{t}H$, $t\bar{t}Z$<br>. BS BY USING CIRCE | SUBROUTINE GENERATOR |
| DETECTOR SIMULATION | PARAMETRIZED MC : SIMDET | SUBROUTINE SIMDET |
| FILL LUND COMMON BLOCK | WRITE RECO OBJECTS INTO LUJETS COMMON BLOCK | SUBROUTINE FILLUJETS |
| EVENT SELECTION + RECONSTRUCTION | JET-FINDING, B-TAGGING, KINEMATICAL FITTING... | SUBROUTINE DOANALYSIS |
| FILL N-TUPLE | | SUBROUTINE FILLNTUPLE |
| USER FINALIZATION | | SUBROUTINE USFIN |

# SIMDET

- FLEXIBLE PARAMETRISED MC THAT SIMULATES THE RESPONSE OF A GENERIC LC DETECTOR FOR $e^+e^-$ PHYSICS

  ⇒ THE CONSEQUENCES OF DIFFERENT BASIC DETECTOR OPTIONS FOR PHYSICS CAN BE EVALUATED

- BASIC COMPONENTS OF THE DETECTOR:

  - VERTEX DETECTOR
  - TRACKER SYSTEM (MAIN TRACKER, FORWARD TRACKER AND FORWARD MUON TRACKER)
  - CALORIMETRY: EM + HAD
  - LUMINOSITY DETECTOR
  - INSTRUMENTED MASK

- APPROACH:
  - GAUSSIAN SMEARING TO CHARGED PARTICLE MOMENTA
  - CALORIMETER RESPONSE TREATED IN A REALISTIC WAY USING A PARAMETRISATION OF RESULTS FROM FULL SIMULATION (BRAHMS)
  - PATTERN RECOGNITION EMULATED BY MEANS OF X-REFERENCE TABLE BETWEEN GENERATED PARTICLES ⇔ DETECTOR RESPONSE.
  - TRACKING EFFICIENCIES, CHARGE MISMEASUREMENTS AND THRESHOLD ENERGIES FOR DETECTORS TAKEN INTO ACCOUNT
  - ENERGY FLOW ALGORITHM: TRACK-CLUSTER MATCHING

  ⇒ LIST OF EF OBJECTS: ELECTRONS, PHOTONS, MUONS, CHARGED HADRONS, NEUTRAL HADRONS AND CLUSTERS OF UNRESOLVED PARTICLES.

- FREE FORMAT DATA CARDS: simdetv3.dat
  ALSO PARAMETERS CAN BE CHANGED IN SIMDET SUBROUTINE SIDETR.

- BUILT-IN INTERFACE FOR INTERNAL EVENT GENERATION BY USING PYTHIA (NOT USED)

- ABILITY TO READ IN EVENTS GENERATED BY CompHEP.

... FOR MORE INFORMATION

http://www.ifh.de/Linear_collider/users_guide_simdetv301.html

# FILES STRUCTURE

- PROGRAM RUNS UNDER UNIX
- CAN BE FOUND AT:

/afs/fnal/files/code/nlc/dl/nlc99/

nlc99.f ⇒ MAIN

nlc99.cards ⇒ FREE FORMAT USER DATA CARDS

simdetv3.dat ⇒ " " SIMDET " "

makefile ⇒ TO COMPILE + LINK TYPE $ omakefile
↳ obtain nlc99.exe

src/ → USER SUBROUTINES

inc/ → cwncommons.inc ⇒ CWN variables

input.inc ⇒ DATA CARDS VARIABLES

lundcommons.inc ⇒ LUND COMMON BLOCKS

herwig59.inc ⇒ HERWIG5.9 COMMON BLOCKS

lib/ → libcirce.a ⇒ BEAMSTRAHLUNG GEN.

libdhelas.a ⇒ HELAS ROUTINES FOR MADGRAPH MEs.