# The Simulation in the ECFA/DESY study

Ties Behnke, DESY

Current system: based on "old" technologies: Fortran, C, GEANT3, PAW etc

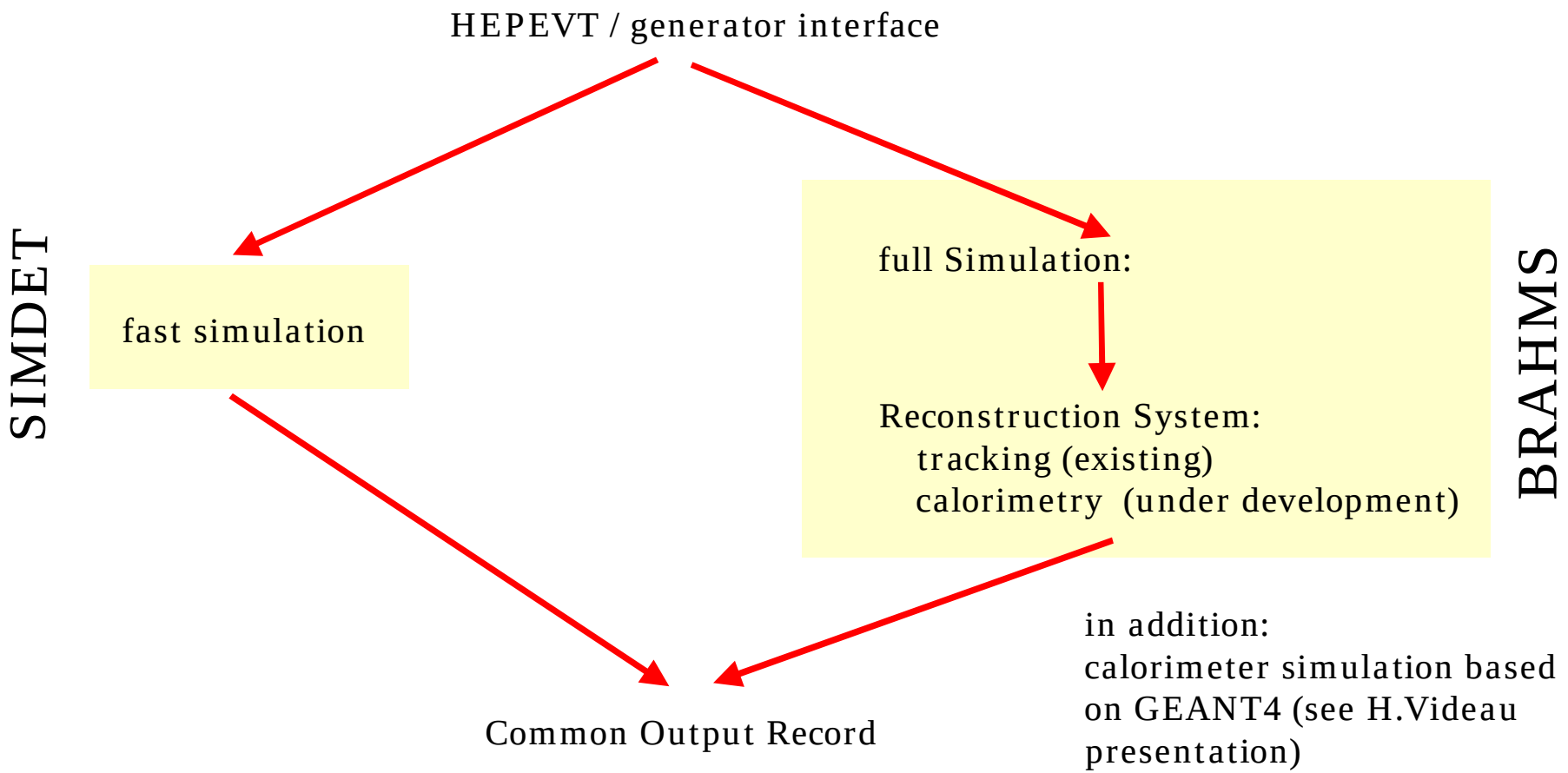
- reuse significantly old (LEP) software
- well debugged and understood framework

but:

- all the problems connected to large scale Fortran based systems
- access to modern software management systems
- object orientation
- long term support
- the main stream goes in a different direction

The future: GEANT4, C++, Java etc

# Current Framework



# BRAHMS

BRAHMS is a GEANT3 based ab inito Monte Carlo and reconstruction package

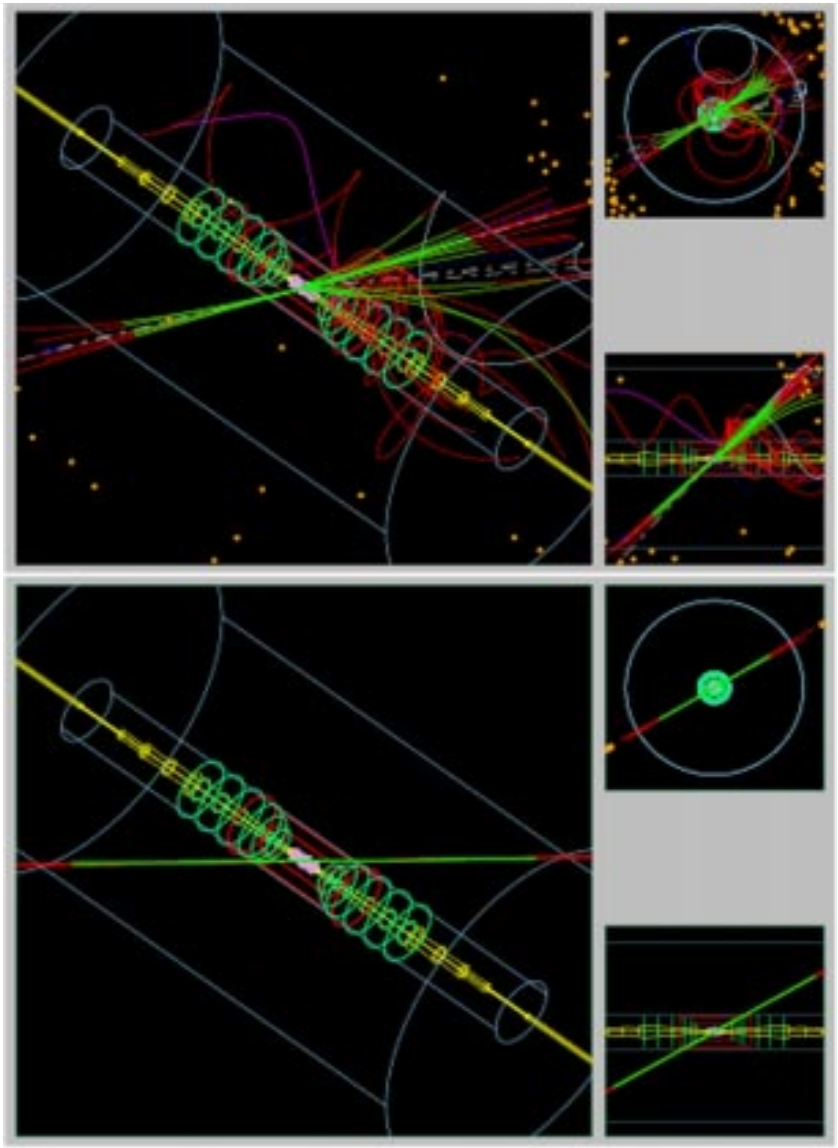
- complete implementation of the TDR tracker
- full implementation of the TDR calorimeter
- full implementation of the forward system
- full implementation of the muon system

BRAHMS contains reconstruction code:

- full track reconstruction and detector merging code
- calorimeter reconstruction code (under development)
- full energy flow algorithms (under development)

Most up−to−date development version: BRAHMS201
next full release: planned for end of year 2001

# Event Display



Visualisation software based on openGL toolkit
(Author: Harald Vogt, DESY Zeuthen)

Easily interfaced to BRAHMS (full simulation)
SIMDET (fast simulation)

status:
- software exists in released form
- still somewhat unstable, but basically usuable
- independent of GEANT3/ GEANT4

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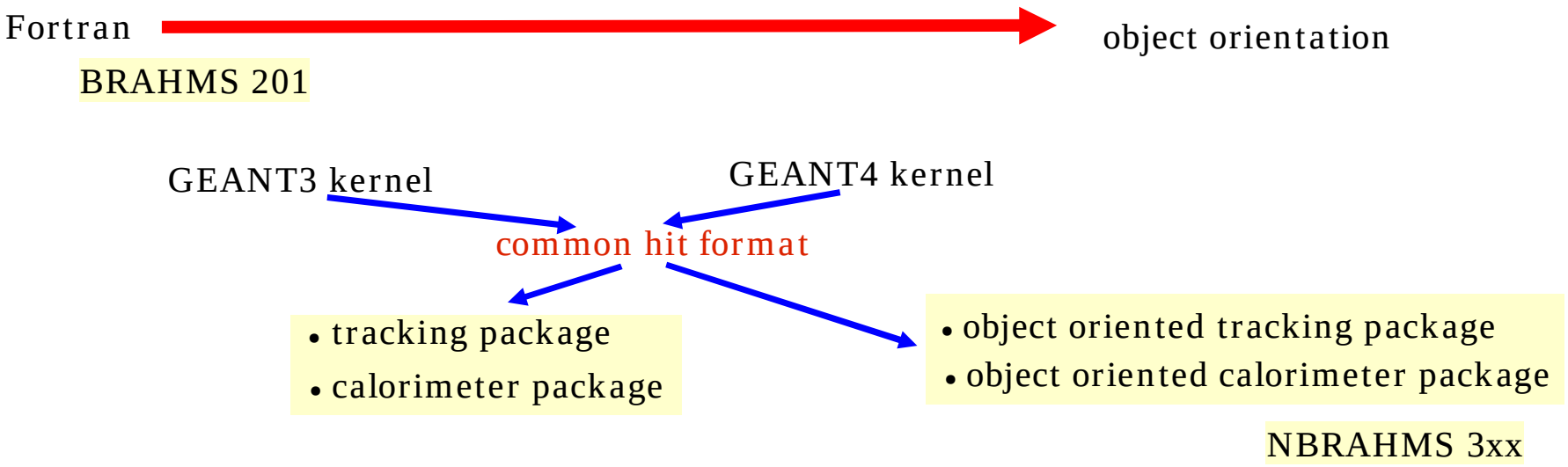
http://www-zeuthen.desy.de/linear_collider

# The Goal

- The goal: develop and maintain a modern simulation environment which is
  - flexible
  - maintainable for a long time to come
  - scalable
- At the same time:
  - continue the support for the existing system for still some time to come
- Ideally: maintain a link between the programs to avoid duplication and translation errors



# The next step

- in Brahms 201:
  - separate simulation and reconstruction
  - agree on a common and compact hit format to store the intermediate event
  - clean up BRAHMS code in such a way that internal "objects" are stored consistently and in a way compatible with a object oriented implementation

- for NBRAHMS
  - define the structure
  - define an environment which is more usable than the current one
  - define the interface to the outside world
  - try to remain flexible, do not commit too early to a particular system

- but most importantly:
  - find a group of people who are going to work on this seriously
  - maintain a coherent effort throughout the study, and possibly even beyond the study

    we should work together closely with our colleagues from the US and from Japan!

# Technical Issues

development tools/ environment

code management tool

code storage and distribution

kdevelop, sniff+, ...??

CVS

WEB based system

mostly relevant to developers

core system and language: GEANT4, C++ for the simulation

relevant to all users

persistency model: store the output

use good old ASCII type files? Alternatives?

access to data files?
remote job submission / data analysis

Use a simple system of file server plus some CPU running a transparent file access and serving system (as used by e.g. the HERA or FNAL collaborations (disk cache project) or at CERN.

The user should decide

# Person Power and Resources

The overall simulation effort is small within the ECFA/DESY study:

- groups involved:
  - France(MOKKA development)
  - Germany (DESY HH and DESY Zeuthen)
  - UK (Graham Blair)
  - some contributions from people from different places

Centrally maintained resources:

- Several WEB pages, accessible through http://www.ifh.de/linear_collider
- A code server in Paris and in Zeuthen

- Soon to come:
  - a Monte Carlo cluster in DESY Hamburg for
    - MC data sample production and storage
    - MC data sample analysis

Clear lack of personpower in this area
Need to focus developments and collect more active people, increase links to other regions

Stage 1 system:
20 dual processor PIII 850MHz CPU
1TB of reliable disk space
2 login nodes for user login

should be available end 2001

# SIMDET V4.0 – Status Report

for M. Pohl and H.J. Schreiber

SIMDET is a parametric Monte Carlo program to simulate the detector at TESLA

Main detector components are implemented according to the TESLA technical design report (TDR), with

- a Vertex Detector
- a tracking System
- electromagnetic and hadronic calorimeters, low angle calorimeter and tagger

Using results from the ab initio Monte Carlo program BRAHMS, track parameters and calorimetric deposits are treated in a realistic way. Pattern recognition is emulated using cross references between generated particles and detector response. An energy flow algorithm defines the output of the program.

# Changes/ News wrt. version 3.0

M. Pohl and H.J. Schreiber

- all detector components / responses
  updated according to the TDR

- LCAL and LATare default detector components

- The tracking system now consists of
  - the main tracker (TPC)
  - the internediate tracker (SIT)
  - the forward chambers (FCH)
  - the forward tracker (FTD)
  - the vertex detector (VTX)

- For CCD version of VTX:
  covariance matrix included (in a parametrised form) (test needed!!)

- For APS: in preparation

# News/ Changes II

M. Pohl and H.J. Schreiber

- dE/dx implemented
- IP constraint (optional) implemented
- new CIRCE version
- PYTHIA 6.1 interface implemented
- CLIC version in preparation (see Marcos talk)
- updated note / user guide in preparation

Expected release date of SIMDET 4.0:

Oct / Nov 2001

note: release might be delayed due to some missing contributions

# SIMDET acknowledgments

M. Pohl and H.J. Schreiber


| | |
|---|---|
| Thorsten Ohl | beamstrahlungs code CIRCE |
| Pable Garcia | PHYTHIA 6.125 implementation |
| Chris Damerell | CCD vertex detector resolutions |
| Marco Battaglia | APS vertex detector resolutions<br>CLIC version |
| Klaus Mönig | BRAHMS tracker resolution,<br>parametrisation of the covariance matrix |
| Michael Hauschild | dE/dx code |
| Vassili Djordjadze | BRAHMS ECAL/HCAL response;<br>dE/dx tracking routines |
| Norbert Tesch,<br>Karsten Büßer | LCAL/ LAT resolutions |
| Harald Vogt | WWW implementation and many discussions |

# Conclusion

Goal of this meeting:

- agree on a strategy for the next generation of software in the ECFA/DESY study
- we are not the first: lets learn from the others, lets try to collaborate as closely as possible
- we have to be open:
  - flexible, only agree on minimal set of common programs
  - avoid proprietory products as much as possible (use open source instead...)
  - however lets agree on structures as early as possible