



Dr. Markus Elsing
CERN Staff
Group Leader EP-ADP

Experience

CERN STAFF AND GROUP LEADER CERN PH-ADP — SINCE 2008

I am currently the group leader of the CERN ATLAS Data Processing (ADP) group (42 people). My group has a Computing and an Offline Section. The Computing Section is responsible for the developed the ATLAS Tier-0 system and for its operation and support. The section is as well responsible for the Distributed Data Management system (RUCIO) that was deployed for ATLAS Run-2 data taking, replacing our old system DQ2. Both, the Tier-0 and the DQ2/RUCIO systems have been operated very successfully during

LHC Run-1 and the ongoing Run-2. The Offline Section has or had several responsibilities in the area of ATLAS Offline Software and Data Preparation, including Inner Detector track reconstruction, simulation software, physics analysis tools and core software. In previous years we contributed as well to the offline data quality infrastructure, the run status pages and the ATLAS event displays. In recent years our focus shifted towards Phase-2 upgrade studies and the design of the ATLAS Inner Tracker upgrade.

At the beginning of Run-1 my role as ATLAS Inner Detector Software Coordinator was to organise the commissioning of the offline tracking software with first beam data and to optimise step-by-step the performance to reach and possibly exceed its design goals. We achieved this with numerous innovations, like a full Bremsstrahlung recovery for electrons inside the track reconstruction, the introduction of Neural Network based cluster splitting to improve tracking in dense environments and an optimisation of the conversion finding for high pileup. As a result ATLAS gained significantly in acceptance, e.g. for the Higgs to 4 electron and $\Upsilon\Upsilon$ channels for the 2012 discovery analysis. For many years I was a member of the ATLAS Simulation Steering Group and I helped overseeing the development of the new simulation framework for ATLAS. I as well started to work on the Phase-2 upgrade activities. I was a member of the Inner Tracker Upgrade Steering Sub-Committee and I took a leading role in the development of a new Inner Tracker (ITk) layout for the ATLAS Phase-2 Upgrade Letter of Intent.

With Run-1 coming to an end, my work shifted towards offline software upgrades in preparation for Run-2. ATLAS was facing the luminosity increase expected for Run-2 and it became clear that we had to significantly speed up the track reconstruction. Together with my group I started a major development program for the ATLAS tracking software project. I as well prepared the second mayor shutdown activity for the offline software project, helping to set up an Analysis Model Study group. Our study group recommended ATLAS to develop a new analysis data format (xAOD) that was natively usable in Root and in our reconstruction framework Athena. We as well recommended to produce the analysis skims using the xAOD format centrally in a train model. I later became ATLAS Software Coordinator and was responsible for the organisation and completion of both development programs in time for the start of Run-2 data taking in 2015. The results were spectacular, the ATLAS reconstruction software for Run-2 was 5.5 times faster than the Run-1 version, at no loss of physics performance. The new analysis model with its centrally produced xAOD skims significantly simplified data analysis in ATLAS and enabled a much faster turnaround time from Run-2 data processing to physics results.

CERN,
EP-DEPARTMENT
1211 GENEVA 23
SWITZERLAND

PHONE
+41227671311

MOBILE
+41754114456

EMAIL
markus.elsing@cern.ch

AGE 52, MARRIED

(Date: March 19th, 2018)

With the start of Run-2 data taking I restarted my ATLAS Fast Physics Monitoring project, which I was already leading during Run-1, to monitor in the incoming first 13 TeV data for eventual signals of new physics. I reported anomalies in the data and in one case I followed up with a full offline analysis that I organised with a group of CERN Fellows. At the same time I contributed to the preparation to the Phase-2 Technical Design Report for the ITk Strip Detector, where I took a leading role in the detector layout development and in performance studies. The work resulted in the ITk Layout Task Force Report (Editors A.Salzburger and C.Gemme) and in the ITk Strip TDR. In 2017 I became the editor of the layout and physics/performance chapters of the ITk Pixel TDR. I am currently running a 2nd Layout Task Force to finalise the ITk design.

Besides my numerous activities in ATLAS I am currently acting as Editor in Chief for a new springer journal on “Computing and Software for Big Science”. Since 2015 I am elected member of the German Committee for Particle Physics (3 year term). I am co-founder of the “Connecting the Dots” international workshops on reconstruction techniques and co-organiser of the CERN data science seminars. I am actively promoting turning RUCIO and the novel common tracking package ACTS, that are both born in my group, into open source projects across several experiments. And last, but not least, I enjoy working with PhD students on their thesis work, as well as giving lectures and public talks.

CERN STAFF AND GROUP LEADER CERN PH-ATC — 2002-2008

I became group leader of the CERN ATLAS Computing Group (ATC) in 2002. My first task was to rebuild the group, which at the time was down to 7 people, and to newly define its role in ATLAS in the final preparation phase for the experiment. In the following years we (ATC) took major responsibilities for the offline software and for the distributed computing of ATLAS. Members of my group wrote under my supervision the first prototypes for a Grid Production System (ProdSys) and the Distributed Data Management System (DQ2). The group later had a leading role in supporting the operation of the first GRID Data Challenges, which I helped overseeing. For many years I was representing CERN in the ATLAS International Computing Board (ICB). In 2007 we gave the responsibility for the Production System to BNL (Panda), while keeping the responsibility for the Distributed Data Management System. This allowed me to redirect parts of my group to start the development of the ATLAS Tier-0 System. We commissioned this system end of 2008 and operate it very successfully since.

I also became in 2002 the ATLAS Inner Detector Software coordinator and I took the lead in building up the tracking software infrastructure that the experiment is using today. I was a member of the Software Project Management Board (SPMB), a role that allowed me to help shaping the offline software infrastructure for ATLAS overall. I initiated the ATLAS common tracking and vertexing project to drive the technical software development and organised a series of ATLAS tracking and alignment workshops (at Ringberg Castle in Germany). I did hands-on development for the NewTracking reconstruction package for the Inner Detector. We demonstrated the first prototype of the new reconstruction software in the context of the ATLAS combined test beam in 2004, which was a good start for commissioning of the offline tracking software with cosmic data. I led the first performance studies with cosmic events taken with the detector at the surface building at Point-I and later with the installed detector down in the pit.

In 2008 I took over the responsibility for the physics and performance studies for the Insertable b-Layer Technical Design Report. I organised a task force and became co-editor of the final document.

CERN RESEARCH STAFF, MEMBER OF THE ATLAS TRIGGER GROUP — 2001-2002

I was leading a small team to design the High Level Trigger (HLT) selection software. I am a main author of the corresponding ATLAS Trigger/DAQ TDR chapters and wrote the backup documentation. I was leading a team of Fellows working on the implementation a first prototype of a HLT framework in ATHENA following my design. We demonstrated that the use of the offline framework and offline reconstruction software in the HLT context is promising (which is the model for the HLT today).

CERN RESEARCH STAFF, MEMBER OF THE DELPHI GROUP — 1998-2001

I worked on LEP-2 heavy flavour electroweak physics and coordinated of the LEP-2 Heavy Flavour subgroup of the LEP Electroweak Working Group. Together with a PhD student under my supervision we did the final measurement of the bottom forward backward asymmetry at the Z pole, one of the most precise measurements at LEP. I coordinated of the DELPHI tracking and energy flow groups. I wrote, together with a student and a fellow from DESY, the track reconstruction package for the TESLA detector studies and co-author of the corresponding parts of the TESLA TDR. This package has been in use by the linear collider community for many years, until it was replaced by more modern C++ software. I did test beam studies of irradiated silicon detectors together with the LHCbVELO group.

CERN RESEARCH FELLOW — 1996-1998

My main research subject was electroweak heavy flavour measurements on the Z pole. I became a member of the LEP Electroweak Working Group. Together with a number of PhD students I did measurements of the Z partial width into charm (R_c) and first studies on heavy flavour production at LEP-2 energies. I started with a few colleagues a complete rewrite of the DELPHI tracking software to overcome systematic effects limiting the precision of many heavy flavour measurements in DELPHI, in particular the R_b measurement which at the time showed hints for a deviation from the Standard Model prediction. This reconstruction project took us 3 years to complete and after the reprocessing the DELPHI result became the most precise R_b measurement at LEP, unfortunately not confirming the deviation observed with previous less precise measurements.

SCIENTIFIC EMPLOYEE, PHYSICS DEPARTMENT, UNIVERSITY OF WUPPERTAL — UNTIL 1996

As a member of the DELPHI Collaboration I worked on electroweak heavy flavour measurements at the Z pole with identified charm hadrons, both for my thesis work. I gained first experience in supervising young members of the group on their analysis work. I was responsible for the alignment and calibration of the DELPHI Forward Chamber B. I development a new tracking package for the LEP-2 DELPHI silicon vertex detector upgrade, which included for the first time pixel sensors in the end-caps, and a general physics analysis software framework for the DELPHI data.

Education

PHD, 1996, DELPHI EXPERIMENT

„Messung der Vorwärts-Rückwärts-Asymmetrien für Charm- und Bottom-Quarks bei Energien nahe der Z-Resonanz“, PhD thesis, University of Wuppertal, 1996, WUB-DIS 96-7.

DIPLOMA, 1993, DELPHI EXPERIMENT

„Messung der Vorwärts-Rückwärts-Asymmetrie für Charm-Quarks auf der Z-Resonanz“, Diploma thesis, University of Wuppertal, 1993, WUD 93-3.