

**IRAKLI CHAKABERIA**

1300 E. Marlatt Ave., Apt. 801  
 Manhattan, KS 66502  
 (785) 317 7881  
 irakli@phys.ksu.edu  
 http://iraklic.web.cern.ch/iraklic/

**PHD THESIS: Study of Helicity Distribution of the Z $\gamma$  Production at the CMS**

- Development of theoretical model for the analysis
- Generation and study of simulated data using various Monte Carlo generators
- Statistical analysis of the acquired data
- Code development using C++, python and ROOT

PROFESSIONAL EXPERIENCE

2008 - PRESENT **Graduate Research Assistant**

*Kansas State University, High Energy Physics*  
 Compact Muon Solenoid (CMS) experiment  
 at the Large Hadron Collider (LHC)

2009 - PRESENT **CMS WebBased Monitoring**

*Fermilab, Batavia, IL*  
 Developing online monitoring  
 tools for the CMS experiment:  
 • CMS PageZero  
 • CMS Page1  
 • FillReport  
 • DataSummary  
 Supervised online/online Data Quality  
 Monitoring shifts at FERMILAB

2008 - 2009 **CMS Pixel Detector**

*Paul Scherrer Institute, Zurich, Switzerland*  
 • Tested and calibrated the pixel detector  
 • Improved pixelOnlineSoftware  
 • Worked on the development of new  
 8 bit analog to digital converted design

2006 - 2008 **Graduate Teaching Assistant**

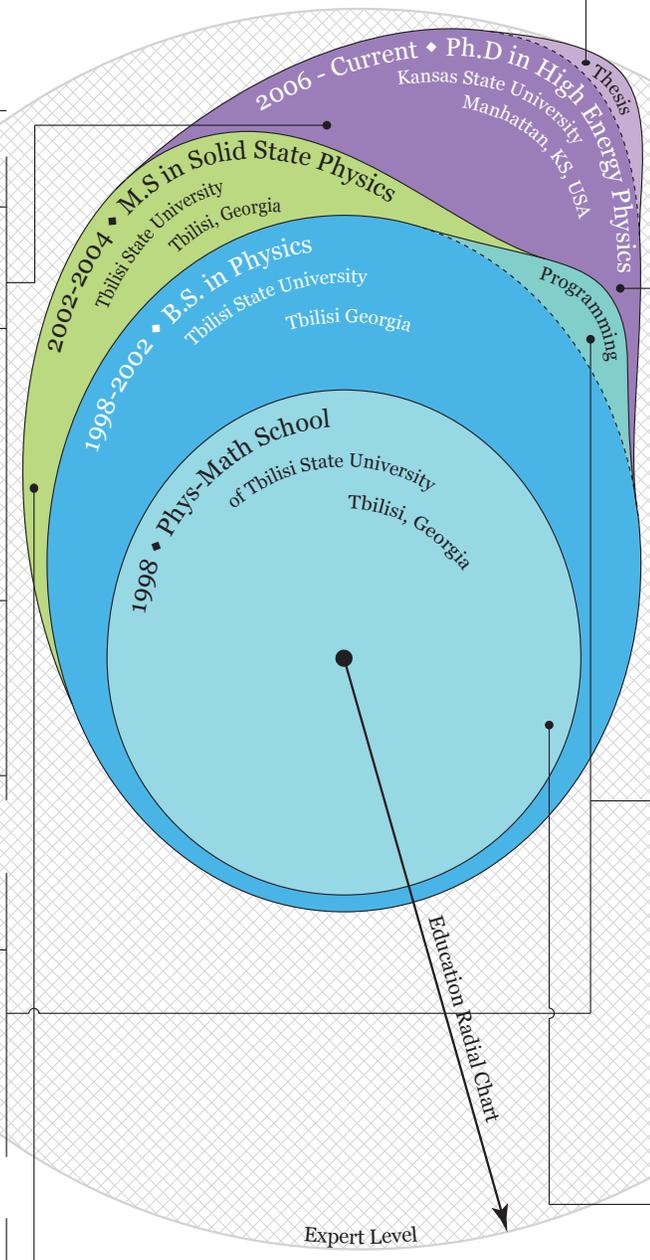
*Kansas State University*  
 • Taught General Physics I, Lab

2004 - 2006 **Technical Engineer**

*Geocell Ltd. (Mobile Service Provider)*  
*Tbilisi, Georgia*  
 • Developed and maintained the software  
 services  
 • Maintained the mobile phone services  
 (SMS, MMS, OTA, etc.) provided by the  
 contractor companies (Telenity, Ericsson,  
 ORGA)  
 • Successfully completed training courses  
 from Telenity and Ericsson.

2000 - 2002 **Research Assistant**

*Tbilisi State University, Solid State Physics*  
 • Worked on inverting the conductivity  
 type of ZnO wide band gap semiconductors



SKILLS

Statistical Data analysis  
 Numerical Simulation  
 Scientific Computing

Programming Languages/Tools

C/C++  
 (Microsoft Visual C++,  
 Borland C++ Builder)  
 Java  
 Pascal (Borland Turbo Pascal,  
 Borland Delphi)  
 Basic (Microsoft QBasic)  
 Perl  
 Python  
 HTML  
 JScript/JavaScript  
 SQL (for databases)

Scientific Frameworks

ROOT  
 CMSSW

Operating Systems

Windows  
 Linux  
 Unix/Solaris

Databases (DBMS)

MySQL  
 ORACLE

Languages

English  
 Russian  
 Georgian

SUMMARY

I have a fundamental knowledge in the area of science - physics - which requires vast amount of skills to be successful in.  
 I have a broad area of expertise within physics, and solid knowledge and experience with software development.  
 The graph above illustrates that I can reach the expert level in many fields in a short period of time.

MOST RECENT SKILL

Adobe Illustrator : learned just to make this CV. Imagine what I can do using my stronger skills!

## DETAILS OF PROFESSIONAL EXPERIENCE

### **2002-2004** Research Assistant - Department of Material Research

Our group was working on inverting the type of conductivity in the wide band gap semiconductors. Achieving this means revolutionizing the industry of electronic devices (and more). To succeed in such a challenging task two-fold innovative approach is necessary. First to understand why this is impossible the way it has been done for decades, and second - how to make it possible. My masters degree research thesis concentrated on the first. I was involved in researching the second part as well and we had some success.

### **2002-2004** Document Controller - Spie Capag - Petrofac JV

This company was constructing one of the biggest oil pipelines in the region as a contractor of the British Petroleum (BP). I was initially interviewed for the 2 month job to help a visiting QA officer with his documentation. Job required knowledge of English and Microsoft Word. At the moment of interview I was not familiar with all the features of the Microsoft Word the position required. They trusted in my ability to become proficient very fast, and the very next day I was doing the job above their expectations and requirements. Within 3 days I was hired for permanent position as a document controller of the company. I offered new solutions for more efficient work of the department. In 2003 BP named us the best department of the company.

### **2004 - 2006** Technical Engineer - Geocell Ltd. (Mobile Phone Service Provider Company)

I was hired as a technical engineer to maintain the operation of the services such as SMS, MMS and OTA. Because of my strong analytic and software skills, I was soon trusted to develop new services for the internal use of the company. Within the scope of my projects, I set up and maintained the MySQL database. Services that I developed were web-based and used perl language in combination with SQL and html to deliver necessary functionalities to a user. The projects were completed before the scheduled deadline and as I last heard a year ago they are still being used by the company.

### **2006 - 2008** Graduate Teaching Assistant - Kansas State University

During my teaching assistantship I acquired very strong skills of communicating the knowledge and ideas to others. To teach physics to non-physics majors, one has to arouse interest in students. To do this, one has to deliver the same idea through different channels and different approaches. My broad knowledge of physics enabled me to be efficient in doing so. I think the same skills are applicable to every environment where exchange and development of ideas take place.

### **2008 - 2009** Worked on the CMS Pixel Detector at Paul Scherrer Institute (PSI), Zurich, Switzerland

The testing and calibration of the state of art detector, was a challenge on its own, but once again my software skills were recognized by the group and I was charged with developing new, or modifying existing, software for better commissioning purposes. The software used was written on C++ using SOAP messaging for communication between web-services on the user side and detector hardware on the other. My abilities were pushed even further and I was put on the project to identify the problems of the existing analog to digital converter (ADC) and design the new one. I have never had such an electronics experience before, but once again, the strong foundation that my skills stand upon enabled me to very quickly understand the problem, learn the tools, and work on the solution. I wrote C++ codes to program FPGA to send and read necessary signals to and from the ADC. I learned how the relevant electronics work and was able to start working on designing the new 8 bit ADC chip.

**2009 - 2013** Worked in CMS WebBased Monitoring (WBM) group on developing online monitoring tools for the CMS experiment

The experiment with over 3000 collaborators all over the world and the detector that needs to be monitored with extreme precision requires vast amount of very reliable software tools. My software skills enabled me to very quickly integrate into the WebBased monitoring team and develop such tools. Most of the monitoring tools I developed are based on the C++ code and ROOT to produce the necessary information/plots, and on java applets publishing the dynamic content in near-online regime. The data for the plots and monitoring information are fetched from ORACLE database and various messaging systems.

**2009 - present** Graduate Research Assistant - Department of High Energy Physics - Kansas State University

On the technical side, my thesis analysis measures 33 parameters by fitting the four-dimensional distribution function to the large data. The function itself cannot be simplified analytically, thus, code has to expand the complicated equation and track all the parameters through the minimization process. The code has to be as efficient as possible to give reliable results in a feasible time. As of now, it takes up to a couple of hours to give the result, due to a complexity of the analysis and amount of the data. The data itself is selected from the extremely large dataset. In high energy physics, we deal with the largest data ever collected and, especially so, in the experiments at Large Hadron Collider (LHC). My analysis code is written in C++, using the ROOT libraries where necessary. The data reconstruction and selection is done using the CMSSW environment, which is a combination of the C++ libraries and *python* configuration files. Within the scope of my PhD research, I had to extensively use monte carlo methods, both by using the existing generators and by writing my own, so called, *toy monte carlo* generators. While writing the code for my analysis, I frequently consulted with Walter Brown, who is a computer scientist and C++ expert at the Fermi National Accelerator Laboratory, and one of the developers of the technical part of the C++ standard library. At some point, he told me "now you are moving from user programmer level to professional programmer level". I think my software skills helped me a lot throughout my physics research and vice versa.

## COMMUNICATING MY RESEARCH TO OTHERS

**2013** Invited speaker at the HEP Seminar at the University of Kansas: Angular distribution of the di-boson production at the CMS

**2012** APS Prairie Section Meeting: Study of  $Z\gamma$  Helicity Distributions at the CMS

**2012** CHEP2012: New Developments in Web Based Monitoring at the CMS Experiment

**2011** American Physical Society, APS April Meeting: Study of  $Z\gamma$  Helicity Distributions at the CMS

**2009** JTERM IV: Physics with  $WZ$  production at LPC

**2008** PIRE Annual Meeting at University of Kansas: CMS Pixel Detector Upgrade