Curriculum Vitae: Z. Z. VILAKAZI; PhD; *MASSAf, FAAS*

Nationality:	South African
Date/Place of Birth:	3 April 1969, Katlehong, South Africa
Email:	zeblon.vilakazi@wits.ac.za
Languages:	isiZulu / siSwati (Mother Tongue), English (First Language), isiXhosa (Excellent), Setswana/Sotho (Good), Afrikaans (Second Language), French (Conversational), German (Basic Conversational) and Russian (Rudimentary)
Current Position:	Vice-Principal; University of the Witwatersrand [1 April 2020 to Present] Deputy Vice-Chancellor (Research and Postgraduate Affairs) and Professor of Physics; University of the Witwatersrand [1 January 2014 to Present]
Education:	Ph. D.; University of the Witwatersrand [1998] CERN-NA43 experiment "*Investigation of coherent correlated effects due to incidence of ultra-relativistic leptons on oriented crystalline matter"* M. Sc.; University of the Witwatersrand [1994] B. Sc.; University of Manchester [1991]

Professional Development:

- Executive Education; Harvard University, Kennedy School of Government; *"Global Leadership and Public Policy for the 21st Century"* [March 2012]
- Visiting Scientist; Commission for Atomic and Alternative Energy/*Commissariat à l'énergie Atomique et aux énergies Alternatives* (CEA) – SACLAY; France [May 2002 – August 2002]
- Post-Doctoral Fellow; CERN NA59 Experiment; *Setting up the lead glass electromagnetic trigger hardware and running Monte Carlo simulations for the experiment* [1998 – 1999]

Scholastic Rating:	Web of Science h-index = 66; Google: h- index = 90, i-10 215

Research Interests: Nuclear and High Energy (Heavy-Ion) Physics and Grid Computing

Past Position: Director; iThemba LABS [January 2007 – December 2013]

Group Executive (Research and Development); South African Nuclear Energy Corporation SOC Limited (NECSA) [April 2011 – December 2013]

The aim of this joint appointment was to create a platform that would guide long-term nuclear research trajectory in both reactor beam-line and accelerator technology at NECSA and iThemba LABS.

Other Appointments: Honorary Professor of Physics; University of Cape Town [2012]

Honorary Professor of Physics; Stellenbosch University [2011]

Honorary Professor of Physics; University of Pretoria [2008]

Senior Lecturer; University of Cape Town [2003 – 2006]

Lecturer; University of Cape Town [1999 – 2002]

National and International Honours – Fellowships, Grants and Awards:

- Fellow; African Academy of Sciences (FAAS) [2016]
- World Economic Forum Young Global Leader [2010]
    - Those aged 40 and below who – through their past global impact – will, according to WEF be major leaders in shaping the future.
- Member: American Physical Society [2017 to Present]
- Academy of Sciences of South Africa (ASSAf) [2007 to Present] and member of Council.
- Principal Investigator for National Research Foundation (NRF) competitive grant application: "*Dimuon Physics at the Large Hadron Collider*", R300 000 [2005 – 2006], renewed [2007 – 2009]. Judged excellent and exemplary by the peer review panel.

Professional Highlights:

- Leading South Africa's entry into the CERN research programme as Group Leader of the University of Cape Town team that played a pivotal role in the developed the High-Level Trigger (HLT) tracker for the ALICE (**A L**arge **I**on **C**ollider **E**xperiment) – at CERN Large Hadron Collider. This effort involved design of highly complex algorithms using real-time data transportation framework. This was the first group on the African continent to independently launch an effort of this magnitude at frontier-level global research – and met all stringent milestones:
    - In November 2004, we realised the successful implementation of the world's first (semi-) real-time data transfer (online Grid) protocol using a custom data transport framework. It was a parallel development to the (propriety) Cloud Computing and semi-autonomous machine learning.
    - The trigger was stress tested in Cape Town and delivered successfully for integration and implementation when the Large Hadron Collider was commissioned in 2008. The team that I established when I joined iThemba LABS and UCT is active within the ALICE experiment and making visible inputs in the Physics Working groups that work on further developments on understanding the state of nuclear matter immediately after the Big Bang.
- From the initial success of establishing a High Energy Physics group in Cape Town, a more expanded SA-CERN programme involving 7 institutions (Universities of the Witwatersrand, Cape Town, Johannesburg, KwaZulu-Natal, Zululand, Western Cape and iThemba LABS) came about as a result. I played a pivotal role in ensuring that this initiative gained recognition by the Department of Science and Innovation as a key strategic flagship programme (with an annual ring-fenced budget of R30 million) for a duration of the Large Hadron Collider project.
- Raised €3.2 million in 2011 and initiated the planning phase of the Rare Isotope Beam (RIB) facility – and the only one in the Southern Hemisphere. Estimated cost of first phase – under a National Treasury approval process – is R600 million. This long-range flagship mega-project (with total cost for all stages of R1.2 billion) for iThemba LABS will keep South Africa at the global forefront of fundamental low- to medium-energy nuclear research and medical applications for decades to come – and will contribute towards growing the next generation of highly qualified technical experts and scientists.
- Played a key role in realising the establishment of the ($50 million) R750 million IBM research laboratory (one of only 13 in the world) at the Tshimologong Digital Innovation Precinct. IBM pioneered the Watson Cognitive Computer which signalled the era of practical uses of Artificial Intelligence.
    - In June 2019, I played a key role in securing a place for Wits to become the first African academic partner in the development of practical applications through access to the IBM Quantum Computing network.
- Contributing towards Wits doubling the number of top rated researchers and achieving double digit growth in research outputs over the past five years. This has resulted in the university now being firmly among the top (150 – 250) universities in the world.
- Getting Wits to become the first African university to join the Harvard/MIT edX MOOC platform which has places Wits at the frontier of online/blended learning.

iThemba LABS Professional Achievements:

I served as the Director of iThemba LABS; the largest research cyclotron facility in Africa and the Southern Hemisphere. Areas of activity at iThemba LABS lie in fields of applied and pure sub-atomic sciences and associated technologies. These can be categorised into three pillars:

- radiation therapy using 66 MeV neutrons and 200 MeV protons;
- radionuclide production; and
- low/medium-energy nuclear physics research.

The research activities undertaken at iThemba LABS are in the spheres of Nuclear and Applied Physics, Materials Research, and Radiation Biophysics. I managed an annual budget of approximately R180 million and was responsible for coordinating a variety of multi-disciplinary research activities on top of ensuring that we maintain operational cost-recovery through sales of various isotopes. Furthermore, I was the overall radiation safety officer, and most importantly, principal guardian of the proton/neutron radiation therapy programme, primarily related to ethics/protocols and medico/legal issues associated with this therapy modality.

During my tenure as Director of iThemba LABS we were able to achieve – among others – the following notables:

- Strong growth in research output over the seven years of tenure and the citation intensity either in line with national averages or on par with similar research facilities worldwide.
- Invitation by the CERN NA61 (SHINE experiment) to help their beam development team with specifications for production of heavy-ions for the non-Large Hadron Collider (SPS) heavy-ion programme. Meaning that iThemba LABS is acknowledged for its excellence in this area of accelerator technology.
- Reaching a general consensus among all South African nuclear and particle physicists and the Department of Science and Technology for iThemba LABS to be a nodal point of focus (or portal) for all external programmes, including CERN and the Joint Institute for Nuclear Research in Russia.
- Initiating a long range plan for iThemba LABS to commission a flag ship isotope facility – which at the time was a R500 million investment in acquisition of cyclotrons and beam delivery systems – ensuring that South Africa is not caught floundering in the backwash of fundamental research and technology development.

Service and Leadership – Scientific Community

International Scientific Advisory Panels and Commissions:

- Member: CERN-ALICE Collaboration Board [2002 – 2006] CERN-ALICE Muon Spectrometer Technical Board: First such appointment from Africa.
- Member: [2007 – 2011] and Chairman [June 2009 – December 2011]; International Atomic Energy Agency (IAEA) Standing Advisory Group on Nuclear Applications.
- Member: Programme Advisory Committee for Nuclear Physics: [2009 to Present]: Joint Institute for Nuclear Research (JINR), Dubna, Russian Federation.
- Member: International Union of Pure and Applied Physics (IUPAP) Working Group (WG9) for Nuclear Physics [2008 – 2013].
- South African representative on the BRICS Working Group for Research Infrastructures and Mega Science Projects [2017 to Present].

Ministerial Advisory Panels:

- Chairperson: Higher Education and Training Ministerial Task Team on the 4th Industrial Revolution [October 2019 – April 2020].
- Chairperson: Department of Science & Innovation Working Group on Quantum Computing and Technology [September 2019 – April 2020].
- Member: Ministerial Panel on the Science, Technology and Innovation Landscape (STILL) review.

National Committees and Boards:

- Have served on various NRF evaluation panels including the NRF-wide review of iThemba LABS in 2004 and NRF grant issuing review panels.
- Member: Board of the NRF [December 2018].
- Member: South African Selection Panel; L'Oréal Women in Science Award [2008 – 2011].
- Member: Board of the Nuclear Industry Association of South Africa (NIASA) [2007 – 2011].
- Chairperson of the Technical Advisory Committee: South African Nuclear Human Resource Programme (SANHARP) [2005 – 2008].
- Member: Interim Steering Committee of the Centre for High Performance Computing (CHPC) [2004 – 2006].
- Chairperson: South African Institute of Physics: Nuclear and Particle Physics Specialist Group [2002 – 2006].
- Member: South African Liaison Committee for the International Union of Pure and Applied Physics (IUPAP) [2001 – 2003].

Selection of International Conference Committees By Invitation:

- Member: International Advisory Committee of the *International Symposium on Exotic Nuclei (EXON),* Petrozadovsk, Russia [2018].
- Member: International Advisory Committee of *the International Conference on High Energy Physics (ICHEP)*, Chicago, United States of America [2016].
- Member: International Advisory Committee of the *International Symposium on Exotic Nuclei,* Kalingrad, Russia [2014].
- Member: International Advisory Committee of *the International Nuclear Physics Conference*, Vancouver, Canada [2010].
- Member: International Advisory Committee of *the International Symposium on Nuclear Physics*, Mumbai, India [2009].
- Member: Advisory Committee of the *Workshop on Cyclotrons: Rising Expectations and Mounting Challenges,* Kolkata, India [2008].

Representative Sample of African Conferences and Workshops:

- Kruger Workshops on Physics at the Large Hadron Collider [2010/2012].
- African School of Physics (Stellenbosch [2010] / Ghana [2012]).
- Chairman: International Workshop on Dimuon Physics in ion-ion Collisions at the Large Hadron Collider [2004].
- Organising Committee: Eighth International Conference on Strange Quark Matter (SQM2004) [2004].
- Chris Engelbrecht Summer School in Theoretical Physics [2002].
- Local Organising Committee: International Conference for Future Accelerators (ICFA), National Accelerator Centre [2001].

University of Cape Town Committees:

- Physics Department Schools Outreach Liaison Committee.
- Science Faculty Communication and Marketing Committee.
- Faculty of Science Re-Admissions Review Committee.
- Engineering and Science Faculty Board.
- University Research Council Conference Travel Committee.
- Internal Examiner for M.Sc. Degrees: Theses and *Ad Hoc* Doctoral Degrees Sub-Committee.

- Search/Selection Committees for Teaching Staff.
- Dean Search Committee of the Science Faculty.
- Executive Member of Staff Association [2002 – 2003].
- External and Internal Examiner for M.Sc. and Ph.D. Dissertations:
    - University of Cape Town.
    - University of the Witwatersrand.
    - Aarhus University, Denmark.
    - University of South Africa.

Mentoring Scientists:

- Dr Edith Zinhle Buthelezi (iThemba Labs) / Honorary Associate Professor (Witwatersrand): Recruited her to join the research group I had established. As she was not a high energy physicist by training, I introduced her to various aspects of high-energy physics (and networks) needed in this frontier research field: analysis and computational tools, ran master classes on fundamental aspects of heavy ion collisions. She is now a highly regarded scientist in the collaboration (of 1 500 members) – and is a convener (on many occasions the only female of African origin) of several high-level task teams that look at the study of nuclear matter under extreme conditions of pressure and temperature.
- Dr Siegfried Förtsch (iThemba LABS): He was a senior nuclear physicist whom I also recruited to the CERN programme. Like Dr Buthelezi, he went through the same induction and is now one of the senior experimental senior coordinators at the CERN ALICE experiment. He also was put in charge of all experimental projects – which was a distinct recognition by the collaboration as he was responsible for the operation of an experiment whose detection apparatus are in excess of $1 billion and has more than 2000 members.
- Dr Rudolph Mahlomola Nchodu (Cape Town): From UCT recruited Dr Nchodu from a lecturing position to iThemba LABS – after realising he showed leadership potential – promoted him (under my guidance) to Head of Nuclear Physics Division and is now a Deputy Director of iThemba LABS.

Post -Doctoral Mentoring:

- Dr Massimiliano Marchisone: (Witwatersrand/iThemba LABS) [2015 – 2017].
- Dr Francesco Bossu: (iThemba LABS) [2012 – 2015].

Graduate Student (Co-) Supervision and Guidance:

- Silvia Delsanto: Joint Ph.D. (Witwatersrand/Turin) [2018 – 2020/1].
- Pieter du Toit: M. Sc. (Pretoria) [2011 – 2013]; Researcher at CSIR.
- Johnson Senosi M. Sc. (Cape Town) [2011– 2013]
- Seforo Mohlalisi: M. Sc. (Cape Town) [2007 – 2009].
- Ibrahim Taoufiq: Ph. D. (Stellenbosch) [2006 – 2008]; Senior Academic at Ilorin, Nigeria.
- Bruce Becker: Ph. D. (Cape Town) [2002 – 2006]; Head Meraka Grid (now based in Italy).
- Artur Szostak: M. Sc. converted into PhD (Cape Town) [2003].
- Bruce Becker: M. Sc. continued to PhD (Cape Town) [2000 – 2002].
- Martin Mueller: B.Sc. Honours (Cape Town) [2000] went on to complete PhD at Stanford.
- Bram van Rens: M. Sc. (Twente) CERN Summer Project [1999].

Undergraduate Courses Taught:

- University of Pretoria:
  - 4th year Nuclear Physics [2007 – 2008] and [2013].
- University of Cape Town:
  - 4th year Physics (Particle) [2004 – 2006].
  - 4th year Physics (Nuclear) [2005].
  - 2nd year Physics (Fluids and Vectors) [2000 – 2002].
  - 1st year Physics (Physics for Engineers) Course Convener [2002 – 2005].
  - 1st year Physics (Thermodynamics) [1999 – 2000].
- University of the Witwatersrand:
  - 1st year Physics (Mechanics) [1998].

Public Outreach:

- I have penned various articles and opinion pieces on Higher Education, Science, Technology and Society such as *Business Day* and *Daily Maverick*.
- Spoke in a TEDx event on why Africa needs to play a key role in shaping the development of Science.
- Delivered a series of public lectures to increase the understanding of science at various high schools and other institutions, including being a Plenary Speaker at the Independent Schools Association of Southern Africa's Combined Conference in 2018.
- Gave numerous TV and radio interviews, particularly when the Large Hadron Collider was launched (in 2008) as part of the public awareness programme

Research Profile

In my early career I worked in low energy nuclear physics as part of my M. Sc. undertaken at the Wit's EN Tandem v.d Graff, This resulted in a paper, "*Elastic and inelastic scattering in the 6Li, 9Be + 12C systems: Excitations of the unbound states and cluster transfers. Nucl. Phys. A 591 (1995) 394-370*". Thereafter, I moved into the field of channelling with the Aarhus group of Erik Uggerhøj at the CERN-NA43 experiment. In this project, the main focus was on the investigations of correlated coherent phenomena due to incidence of high-energy leptons on crystals. Some interesting studies – which among others include the Landau Pomeranchuk Migdal effect – were studied and form a significant part of the publications in the list below. At the NA59 experiment (a follow up to NA43), we sought to extend these studies to look at possible uses of crystals as sources of polarised, intense and tunable beams for (among others) some aspects of using photons as probes to address the so-called spin crisis of the nucleon.

It had been my goal to realise an establishment of a frontier level high-energy physics research programme here in South Africa when I joined the University of Cape Town as a lecturer in 2000. In 2001 the UCT-CERN research group, of which I was a co-founder (along with Professor Jean Cleymans – a leading theoretical physicist at UCT) was accepted by the ALICE collaboration. I took charge of the experimental effort (development of the high HLT and physics simulations). In this regard, expertise in experimental, theoretical and computational physics was brought together in order to consolidate the effort of investigating some aspects of Large Hadron Collider heavy-ion phenomenon.

From 2002 to 2006, I was the group leader of the Cape Town high-level trigger effort. The ALICE Dimuon Spectrometer HLT (dHLT) is an on-line processing stage whose primary function is to select topologically interesting events that contain distinct physics signals from heavy resonance decays such as J/ψ and ϒ particles, amidst unwanted background events. It forms part of the HLT of the ALICE experiment, whose goal is to reduce the large data rate of about 25 GB/s (gigabyte per second) from the ALICE detectors by an order of magnitude, without losing interesting physics events. The dHLT has been implemented as a software trigger within a high performance and fault tolerant data transportation framework, which is run on a large cluster of commodity compute nodes. To reach the required processing speeds, the system is built as a concurrent system with a hierarchy of processing steps. The main algorithms perform partial event reconstruction, starting with hit reconstruction on the level of the raw data received from the spectrometer. Then a tracking algorithm finds track candidates from the reconstructed hit points. Physical parameters such as momentum are extracted from the track candidates and finally a dHLT decision is made to readout the event based on certain trigger criteria.

In spite of very tight budgetary constraints, poor network connectivity, operating at a distance and a heavy teaching and administration load, I was able to play a pivotal role and leadership in the formation of one of the most dynamic physics research groups in the country, as demonstrated by the following notable achievements to date:

- Setting up one of the top performing computational clusters in the country. In fact when the cluster was inaugurated in 2002, it was placed number 52 of the top 500 performance ranking of all clusters of its size in the world.
- Contributed to a chapter in a book of the Technical Design Report (TDR). This document serves as a reference and a benchmark for all technical matters relating to the high level trigger, trigger and data acquisition.
- In 2004, I was given the responsibility of chairing an annual "*International Workshop on Dimuon Physics in ion-ion collisions at the Large Hadron Collider*".
- Under my leadership, the research group successfully executed stringent benchmark and data challenges on the HLT that was developed at UCT and later on at iThemba LABS. These include (November 2004) the world's first (semi-) real-time data transfer (online Grid) protocol using a custom transport framework.
- Finally, the muon HLT tacker that was developed by my team in Cape Town (and later at Cagliari, Italy and CERN) was successfully commissioned in 2008.
- A strong research group is now firmly established at iThemba LABS which works jointly with the former group at UCT – and they are looking at applying the HLT tools for the harvest of data that emerged from the early runs of the Large Hadron Collider

Selection of Research Seminar and Invited Talks and Conference Presentations[1]:

- International Symposium on Exotic Nuclei (EXON 2018): Petrozadovsk, Russia [2018].
- Meeting: American Physical Society [2017].
- International Conference on High Energy Physics (ICHEP): Plenary Presenter; Chicago, United States of America [2016].
- International Symposium on Exotic Nuclei (EXON 2014): Invited Presenter; Kaliningrad, Russia [2014].
- Workshop on Frontiers of Nuclear Physics: Invited Presenter; Guadeloupe, France [2013].
- International Symposium on Exotic Nuclei (EXON 2012): Vladivostok, Russia [2012].
- International Symposium on Exciting Physics: Makutsi Safari Farm, South Africa [2011].
- Workshop: "*Cyclotrons: Rising Expectations and Mounting Challenges*"; Kolkata [2008].
- Physics Colloquium: University of KwaZulu-Natal [2007].
- Physics Colloquium: University of the Witwatersrand [2007].

[1] The list excludes regular presentations at the annual South African Institute of Physics (SAIP) conference and at several CERN-NA43/59 and ALICE collaboration meetings in Geneva, Florence, Nantes, Calcutta, Sardinia, Heidelberg and Cape Town.

- Physics Colloquium: University of Stellenbosch [2007].
- International Workshop: Dimuon Physics at the Large Hadron Collider; Badesi, Sardinia, Italy [2006].
- 51st South African Institute of Physics Conference: Plenary Speaker [2006].
- Dual Congress on Medical Physics: Parallel Talk; Seoul, Korea [2006].
- Global Science Forum: OECD (Organisation for Economic Co-operation and Development), Workshop on Grids and Basic Research Programmes; Sydney, Australia [2005].
- International Workshop on Dimuon Physics in ion-ion Collisions at the Large Hadron Collider: Turin, Italy [2003].
- International Workshop on Dimuon Physics: Mont-Dore, France [2002].
- Nuclear-Particle Physics Seminar: University of Natal; 46th South African Institute of Physics [2001].
- Nuclear Theory Colloquium: University of the Witwatersrand [2000].
- NA43 Collaboration: University of Florence [1998].
- Physics Colloquium: University of the Witwatersrand [1997].
- Physics Colloquium: University of Cape Town [1997].
- Physics Colloquium: University of Durban-Westville [1996].

Selection of Representative Output of 325 Journal Articles[2]:

ALICE Collaboration Papers:

1. Aamodt, K.; Quintana, A. Abrahantes; Achenbach, R.; *et al*. The ALICE experiment at the CERN Large Hadron Collider; JOURNAL OF INSTRUMENTATION Volume: 3 [**1000+ citations**].
2. Aamodt, K.; Abelev, B.; Abrahantes Quintana, A.; *et al.* Higher Harmonic Anisotropic Flow Measurements of Charged Particles in Pb-Pb Collisions at root s(NN)=2.76 TeV; Phys. Rev. Lett. 032301 (2011) [**500+citations**].

CERN High-Level Trigger Team Co-Authored Papers:

1. Event Reconstruction Performance of the ALICE High Level Trigger p plus p for Collisions, Richter M.; Aamodt K.; Alt T.; et al. IEEE TRANSACTIONS ON NUCLEAR SCIENCE Volume: 58 Issue: 4 (2011).
2. ALICE HLT High Speed Tracking on GPU, Gorbunov Sergey; Rohr David; Aamodt Kenneth; et al. IEEE TRANSACTIONS ON NUCLEAR SCIENCE Volume: 58 Issue: 4 (2011
3. Real Time Global Tests of the ALICE High Level Trigger Data Transport Framework; B. Becker, S. Chattopadhyay, C. Cicalo J. Cleymans, G. de Vaux, R.W. Fearick, V. Lindenstruth, M. Richter, D. Rorich, F. Staley, T.M. Steinbeck, A. Szostak, H. Tilsner, R. Weis, **Z.Z. Vilakazi**; IEEE Trans.Nucl.Sci.55:703-709 (2008).
4. High Level Trigger Online Calibration framework in ALICE: S Bablok *et al,* J.Phys. Conf .Server: 119 (2008) 022007.
5. The ALICE dimuon spectrometer high level trigger; Becker, T.B.[a b], Chattopadhyay, S.[c], Cicalo, C.[b], Das, I.[c], De Vaux, G.[a], Fearick, R.[a], Lindenstruth, V.[d], Marras, D.[b], Sanyal, A.[c], Siddhanta, S.[b c], Staley, F.[e], Steinbeck, T.[d], Szostak, A.[a b], Usai, G.[b], **Vilakazi, Z**.[a], IEEE Nuclear Science Symposium Conference Record , art. no. 4774751, pp. 1846-1850 (2008).
6. T. Alt, H. Appelshauser, S. Bablok, B. Becker, S. Chattopadhyay, C. Cheshkov, C. Cicalo, J. Cleymans, R.W. Fearick, H. Helstrup, V. Lindenstruth, C. Loizides, M. Richter, D. Rohrich, B. Skaali, F. Staley, T. Steinbeck, A. Szostak, H. Tilsner, K. Ullaland, G. de Vaux, A. Vestbo, T. Vik, **Z.Z. Vilakazi**, A. Wiebalck, G. Ovrebekk; Benchmarks and implementation of the ALICE high level trigger IEEE Trans.Nucl.Sci.53:854-858 (2006).
7. Alt, T.; Lindenstruth, V.; Steinbeck, T.; Tilsner, H.; Wiebalck, A.; Appelshauser, H.; Loizides, C.; Becker, B.; Cleymans, J.; de Vaux, G.; Fearick, R.W.; Szostak, A.; **Vilakazi, Z.Z**.; Chattopadhyay, S.; Cheshkov, C.; Cicalo, C.; Helstrup, H.; Richter, M.; Rohrich, D.; Ullaland, K.; Vestbo, A.; Skaali, B.; Vik, T.; Staley,F.; Benchmarks and implementation of the ALICE high level trigger; Real Time Conference, 2005. 14th IEEE-NPSS.

[2] For a complete list of ALICE papers follow the HEP archive link on **http://inspirehep.net/search?ln=en&ln=en&p=find+a+vilakazi** and/or Web of Science (Vilakazi, z*).

CERN NA43/59 Publications:

1. Coherent bremsstrahlung, coherent pair production, birefringence and polarimetry in the 20-170 GeV energy range using aligned crystals; A. Apyan, R.O. Avakian, B. Badelek, S. Ballestrero, C. Biino, I. Birol, P. Cenci, S.H. Connell, S. Eichblatt, T. Fonseca, A. Freund, B. Gorini, R. Groess, K. Ispirian, T.J. Ketel, Yu.V. Kononets, A. Lopez, A. Mangiarotti, B. van Rens, J.P.F. Sellschop, M. Shieh, P. Sona, V. Strakhovenko, E. Uggerhoj, U.I. Uggerhj, G. Unel, M. Velasco, **Z.Z. Vilakazi**, O. Wessely; Phys.Rev.ST Accel.Beams 11:041001 (2008).
2. A. Apyan, R.O. Avakian, B. Badelek, S. Ballestrero, C. Biino, I. Birol, P. Cenci, S.H. Connell, S. Eichblatt, T. Fonseca, A. Freund, B. Gorini, R. Groess, K. Ispirian, T.J. Ketel, Yu.V. Kononets, A. Lopez, A. Mangiarotti, B. van Rens, J.P.F. Sellschop, M. Shieh, P. Sona, V. Strakhovenko, E. Uggerhoj, U.I. Uggerhoj, G. Unel, M. Velasco, **Z.Z. Vilakazi**, O. Wessely; Results on the coherent interaction of high energy electrons and photons in oriented single crystals. Nucl.Instrum.Meth.B119:128-137 (2005).
3. H. D. Hansen; U. I. Uggerhoj; C. Biino; S. Ballestrero; A. Mangiarotti; P. Sona; T. J. Ketel; **Z. Z. Vilakazi**, Landau-Pomeranchuk-Migdal effect for multihundred GeV electrons. Phys. Rev. D 69 (2004) 032001.
4. H.D. Hansen; U.I. Uggerhoj; C. Biino; S. Ballestrero; A. Mangiarotti; P. Sona ; T.J. Ketel; **Z.Z. Vilakazi**, Is the electron radiation length constant at high energies? Phys. Rev. Lett. 91 (2003) 014801.
5. G. Unel, A. Apyan, R.O. Avakian, B. Badelek, S. Ballestrero, C. Biino, I. Birol, P. Cenci, S.H. Connell, S. Eichblatt, T. Fonseca, A. Freund, B. Gorini, R. Groess, K. Ispirian, T. Ketel, Yu.V. Kononets, A. Lopez, A Mangiarotti, U. Uggerhoj, A. Perego, B. van Rens, J.P.F. Sellschop, M. Shieh, P. Sona, V. Strakhovenko, E. Uggerhoj, M. Velasco, **Z.Z. Vilakazi**, U. Wessely: Measuring The Linear Polarisation of Gammas in 20-GeV TO 170-GeV Range; Nucl.Phys.A721:1071-1074, 2003.
6. G. Unel, A. Apyan, R.O. Avakian, S. Ballestrero, C. Biino, P. Cenci, S.H. Connell, S. Eichblatt, T. Fonseca, A. Freund, A. Gianoli, R. Groess, B. Gorini, K. Ispirian, T. Ketel, A. Lopez, S. Luitz, U. Mikkelsen, E. Menichetti, A. Perego, B. van Rens, J.P.F. Sellschop, P. Sona, V. Strakhovenko, E. Uggerhoj, M. Velasco, **Z.Z. Vilakazi**, O. Wessely: The Na59 experiment at CERN, Int.J.Mod.Phys.A16S1C:1071-1073 (2001).
7. K. Kirsebom; U. Mikkelsen; E. Uggerhoj; K. Elsener; S. Ballestrero; P. Sona; S.H. Connell; J.P.F. Sellschop; **Z.Z. Vilakazi**: Radiation emission and its influence on the motion of multi-GeV electrons and positrons incident on a single diamond crystal, Nucl. Instrum. Meth. B174 (2001) 274-296.
8. K. Kirsebom ; U. Mikkelsen ; E. Uggerhoj;K. Elsener; S. Ballestrero; P. Sona; **Z.Z. Vilakazi**: First measurements of the unique influence of spin on the energy loss of ultra-relativistic electrons in strong electromagnetic fields. Phys. Rev. Lett. 87 (2001) 4801.
9. A. Baurichter, C. Biino, M. Clément, N. Doble, K. Elsener, G. Fidecaro, A. Freund, L. Gatignon, P. Grafström, M. Gyr, M. Hage-Ali, W. Herr, P. Keppler, K. Kirsebom, J. Klem, J. Major, R. Medenwaldt, U. Mikkelsen, S. P. Møller, P. Siffert, E. Uggerhøj, **Z.Z. Vilakazi** and E. Weisse: Channeling of high-energy particles in bent crystals – Experiments at the CERN SPS; Nucl.Instrum.Meth. B164 (2000) 472-478.
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