

September 22, 2007

## CURRICULUM VITAE

### **ARNULFO ZEPEDA**

#### **I. Education**

- Undergraduate: 1962-1967 Faculty of Nuclear and Technical Physics of the Technical University of Prague. M.S., 1967.
- 1967-1970 Centro de Investigación y de Estudios Avanzados del IPN, México. Ph.D. 1970.
- 1970-1972 The Rockefeller University, New York, USA. Ph.D. 1972.

#### **Employment**

- Professor, Centro de Investigación y de Estudios Avanzados (Cinvestav). Septiembre 1972 - present.
- Associate Professor, Cinvestav. July and August 1972.
- Visiting Professor, University of Bern, Insitüt für Theoretische Physik, Switzerland, 1978 - 1979.
- Visiting Scientist, International School for Advanced Studies, Trieste, Italy 1989.
- Visiting Professor, Departament of Theoretical Physics, University of Valencia, Valencia, Spain. 1995 - 1996.
- Visiting Professor, Instituto de Física, Universidad de Guanajuato. 2002 - 2003.

#### **III. Research Activities**

- Theoretical physics in elementary particle physics, chiral perturbation theory, phenomenology of particle properties, gran unification models. 1970-present
- Representative of Mexico in the Pierre Auger Collaboraction 1995 - present.
- Member of the ALICE Collaboration, tests and instalation of cosmic ray detectors. 200-present

- Member of the HAWC Collaboration. 2007-present.

### Selected Honors and Awards

1. Guggenheim Fellowship (1982-1983).
2. Associate Member of the International Centre for Theoretical Physics Italy (1982-1988).
3. Member of the Sistema Nacional de Investigadores. Nivel III since 1984 - present.
4. President of the Division of Particles and Fields of the Mexican Physical Society, 1990-1992.
5. President of the Mexican Physical Society, 1992 - 1994.
6. Fellow of the American Physical Society since 1993.
7. Senior Associate Member of the International Centre for Theoretical Physics Italy (1998-2003).
8. Mexican Physical Society award for Distinguished Role in the Development of Physics in Mexico, 2001
9. X Mexican School of Particles and Fields in honor of Arnulfo Zepeda and A. Garcia, 2002
10. Medall of the Division of Particles and Fields of the Mexican Physical Society, 2002
11. Medall of Cinvestav for "Leadership in the formation of new researchers"

### Selected Research Publications

- Pagels H. y Zepeda A. "Where are the corrections to the Goldberger-Treiman Relation". Physical Review **D5**, (1972) 3262-3268.
- Bég M.A.B. y Zepeda A. "Pion radius and isovector nucleon radii in the limit of small pion mass". Physical Review **D6**, (1972) 2912-2918.
- Ali A., Bernstein J. y Zepeda A. "Asymptotic freedom of Yang Mills fields in the Coloumb gauge". Physical Review **D12**, (1975) 503-507.
- Domínguez C. A. y Zepeda A. "Chiral symmetry breaking, Dashen mass formula and the decay  $\eta \rightarrow 3\pi$ ". Physical Review **D18**, (1978) 884-888.
- Zepeda A. "Mass of the up quark". Physical Review Letters, **41**, (1978) 139-141.
- Minkowsky P. y Zepeda A. "Hadron masses and current algebra quark masses". Nuclear Physics, **B164**, (1980) 25-44.

- Gasser J. y Zepeda A. “Approaching the chiral limit in QCD”. Nuclear Physics **B174**, (1980) 445-473.
- Böhm M., Huerta R. y Zepeda A. “Spin dependent quark-quark interaction and baryon magnetic moments”. Physical Review **D25**, (1982) 223-234.
- Hollik W. y Zepeda A. “Polarized Bhabha scattering in multiboson electroweak gauge models”. Zeitschrift für Physik C, Particles and Fields **12**, (1982) 67-65.
- Zepeda A. “Flavor diagonal neutral currents from extended hypercolor”. Physics Letters, **132B**, (1983) 407-412; **195B**, (1997) 623E.
- Lucio J.L., Rosado A. y Zepeda A. “Neutrino charge in the linear  $R_\xi$  Gauge”. Physical Review **D29**, (1984) 1539-1541.
- Lucio J.L., Rosado A. y Zepeda A. “Characteristic size for the neutrino”. Physical Review **D31**, (1985) 1091-1096.
- Ponce W. y Zepeda A. “The price of simple unification”. Revista Mexicana de Física **37**, (1991) 68-79.
- A. H. Galeana, Martínez R., Ponce W. y Zepeda A. “Unification of forces and flavors for three families”. Physical Review **D44**, (1991) 2166-2178.
- A. Pérez-Lorenzana, W. A. Ponce y A. Zepeda, “One step non SUSY unification”. Europhysics Lett. **39**, (1997) 141-146.
- Use of decay electrons from stopping muons as a tool for calibration of Cherenkov tanks of the Pierre Auger Project. Luis Villaseñor, F. Alcaraz, E. Cantoral, A. Cordero, M. Falfan, A. Fernández, P. Miranda, R. López, M. Medina, C. Pacheco, S. Román, H. Salazar, M. Vargas, J. Valdés, and A. Zepeda. Proceedings of the XXV International Cosmic Ray Conference, Durban, South Africa. Eds. M. S. Potgieter, B.C. Raubenheimer and D.J. Van der Walt, (1997), pp. 197-200.
- A. Pérez-Lorenzana, W. A. Ponce y A. Zepeda, “Non-SUSY and SUSY One Step Unification”. Mod. Phys. Lett. A, **13**, (1998) 2153-2162.
- M. Alarcón, M. Medina, L. Villaseñor E. Cantoral, A. Fernández, R. López, M. Rubin, S. Román, H. Salazar, M. Vargas, L. Nellen, J. C. D’Olivo, J. Valdés, and A. Zepeda “Studies with a water Čerenkov detector prototype for the Pierre Auger cosmic ray Observatory”. Rev. Mex. Física **44**, 479-483 (1998).
- M. Alarcón, F. Alcaráz, J. Barrera, E. Cantoral, A. Fernández, M. Medina, L. Nellen, C. Pacheco, S. Roman, H. Salazar, J. Valdés, M. Vargas, L. Villaseñor, and A. Zepeda. “Calibration and monitoring of water Čerenkov detectors with stopping and crossing muons”. Nucl. Instrum. Meth. **A 420**, (1999) 39-47.
- A. Pérez-Lorenzana, W. A. Ponce y A. Zepeda, “Nonsupersymmetric gauge coupling unification in  $[SU(6)]^4 \times Z_4$  and proton stability”. Rev. Mex. de Física **45**, (1999) 109-121.

- J. C. D’Olivo, A. Fernández, M. Medina, L. Nellen, S. Román, H. Salazar, J. Valdés-Galicia, M. Vargas, L. Villaseñor and A. Zepeda, “Stability and calibration of a water Čerenkov detector prototype”. Very High Energy Cosmic Ray Interactions, Proceedings of the Xth International Symposium on Very High Energy Cosmic Ray Interactions, Laboratori Nazionali del Gran Sasso, Assergi, Italy, 12-17 July 1998; Ed. by O Saavedra, Nucl. Phys. B (Procc. Suppl) **75 A**(1999) 389.
- J. A. Hinton, A. A. Watson, E. García, R. López, L. Nellen, L. Villaseñor, and A. Zepeda. “The mass composition of cosmic rays from  $3 \times 10^{17}$  to  $3 \times 10^{18}$  eV”. Contribution OG.1.3.13 to Proceedings of the XVI International Cosmic Ray Conference (1999). Edited by D. Kieda, M. Salamon, & B. Dingus. The University of Utah, Department of Physics, Vol. 3, p. 288.
- A. Zepeda (for the Pierre Auger Collaboration), “The Pierre Auger Observatory”. Proceedings of the VII Workshop on Particles and Fields, Mérida, 1999, Ed. by A. Ayala, J.G. Contreras, and G. Herrera. AIP Conference Proceedings 531, p. 280-283, 2000.
- J.C. Arteaga-Velázquez, Carlos Vázquez-López and Arnulfo Zepeda. “Diffuse reflectivity of Tyvek in water anisotropical effects”. Proceedings of the International Workshop on Observing Ultra High Energy Cosmic Rays from Space and Earth. Metepec, 2000. H. Salazar, L. Villaseñor and A. Zepeda, Editors. AIP Conference Proceedings, Vol 566, p. 350-353, 2001.
- J.C. Arteaga-Velázquez, Carlos Vázquez-López and Arnulfo Zepeda. “Diffuse reflectivity of Tyvek in water, and anisotropical effects”. Proceedings of the 11th International Symposium on very-High-Energy Cosmic Ray Interactions: The Gleb Wataghin Centennial (ISVHECRI 2000), Brazil, 2000. Nucl. Phys. Proc. Suppl **97**, 231-234, 2001.
- O. Saavedra, O. Martínez, H. Salazar, A. Velarde, L. Villaseñor and A. Zepeda, “Cosmic Ray Observations at Chacaltaya and Cerro de la Negra Combined with the Pierre Auger and Milagro Observatories”. Proceedings of the International Workshop on Observing Ultra-high Energy Cosmic Rays from Space and Earth, Metepec, 2000. H. Salazar, L. Villaseñor and A. Zepeda Editors. AIP Conference Proceedings Vol 566, p. 11-21, 2001.
- O. Saavedra, H. Salazar, O. Martinez, A. Velarde, L. Villaseñor y A. Zepeda, Cosmic ray observations at Chacaltaya and Cerro La Negra combined with the Pierre Auger and Milagro observatories: GRBs and search for cosmic ray correlations, 27th International Cosmic ray Conference Proceedings, Hamburgo, 2001 (Disponible en CD).
- “ACORDE, a cosmic ray detector in ALICE. First simulation studies, B. Alessandro, E. Casimiro, U. Cotti, A. Fernández, E. Gámez, N. Jiménez, R. López, S.

- Román, M. Sitta, M. A. Vargas, S. Vergara, L. Villaseñor, and A. Zepeda. Proceedings of the 28th International Cosmic Ray Conference, Tsukuba, August 2003, pag. 1203-1206.
- "Properties and Performance of the Prototype Instrument for the Pierre Auger Observatory", AUGER COLLABORATION. Nuclear Instruments and Methods in Physics Research, Section A, 523,pp 50-95, 2004.
  - C. García-Canal, R. Luna, S. Sciutto and A. Zepeda, "Influence of diffractive interactions on cosmic ray air showers", Phys. Rev. **D70**, 114034 (2004).
  - J.C. Arteaga-Velázquez, Carlos Vázquez-López and Arnulfo Zepeda. "A measurement of the diffuse reflectivity of 1056 Tyvek in air and water", Nuclear Inst. and Methods in Physics Research, A553:312-316,2005.
  - AN UPPER LIMIT TO THE PHOTON FRACTION IN COSMIC RAYS ABOVE  $10^{19}$  eV FROM THE PIERRE AUGER OBSERVATORY. Jun 2006. 29p. By Pierre Auger Collaboration (J. Abraham, et al.) Astropart.Phys. 27 (2007) 155-168
  - Anisotropy studies around the Galactic Centre at EeV energies with the Auger Observatory. By Pierre Auger Collaboration (M. Aglietta et al.). FERMILAB-PUB-06-241-A-TD, Jul 2006. e-Print Archive: astro-ph/0607382