

Ashot Chilingarian's short scientific biography

Prof. Ashot Chilingarian is the director of A.Alikhanyan National laboratory (Yerevan Physics Institute, YerPhI).

Dr. Chilingarian earned his Ph.D. in 1984 and Doctorate of Science in Physics and Mathematics in 1991 from YerPhI. From 1971 to 1993 he was a scientist, senior scientist and data analysis group leader at the Yerevan Physics Institute. In 1993 Ashot Chilingarian became the deputy director of Yerevan Physics Institute, as well as head of the Cosmic Ray Division, in 2008 □ director of the Yerevan Physics institute.

His expertise is in the sphere of high-energy astroparticle physics, high-energy phenomena in the atmosphere, particle detector instrumentation and advanced statistical computation. His current interests include the galactic and solar cosmic ray origin and acceleration, atmospheric electricity and lightning phenomena, detection of secondary cosmic ray fluxes at the Earth's surface, space weather and space climate.

Prof. Chilingarian is the author of the ANI (Analysis and Nonparametric Inference) computer code library, which has been extensively used during the last few decades for multidimensional analysis of data from modern cosmic ray detectors. He also introduced the "multidimensional nonlinear cuts" method for analyzing data from the Atmospheric Cherenkov Telescopes (ACT); these techniques helps to reliably proof existence of the flux of very high energy gamma rays from Crab nebula measured by the Whipple Cherenkov telescope thus establishing the new window to Universe.

The methodology of the event-by-event analysis for the Extensive Air Shower experiments, developed by Ashot Chilingarian, allows the estimation of the energy spectra of the separate groups of primary nucleolus (only the all-particle spectrum was prior to that); the partial spectra of primary cosmic rays measured by MAKET-ANI and KASCADE detectors prove mass-dependent position of knee and helps to develop particle acceleration models.

The main scientific results of A.Chilingarian are as follows:

- Discovery of the features of Galactic Cosmic Ray spectra such as: the very sharp change of the power spectra index (~ 1) for the light nuclei group at 2-4 PeV and no pronounced change for the heavy nuclei group (at least for energies 20-30 PeV)
- Discovery of the charge dependent "knee" in the energy spectra pointing to the shock acceleration initiated by the supernovae blasts as most probable mechanism of particle acceleration
- Discovery of energetic protons (with energies greater than 20 GeV) accelerated in the vicinity of the Sun on 20 January 2005 during Ground Level Enhancement (GLE) event N 69.
- Discovery of simultaneous fluxes of electrons, gamma rays and neutrons measured at mountain altitudes, proving the existence of the new high-energy phenomenon in the thunderstorm atmospheres.

- Discovery of the "Cloud extensive showers CESs" "extended showers initiated in thunderclouds by the accelerated in cloud electrical field electrons" "first direct evidence of the run-away process in the terrestrial atmosphere.
- Development of the Aragats Space Environmental center (ASEC) as its founder. ASEC is equipped with various particle detectors for Space research.
- Founding of the worldwide network of new particle detectors for researches in space weather and solar physics, named SEVAN (Space Environment Viewing and Analysis Network). Nodes of the SEVAN network are now operating in Armenia, India, Bulgaria and Croatia and Slovakia.
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Prof. Chilingarian has been lecturing at YSU near 40 years. He delivers courses on Neural Networks, Data Analysis, Introduction to High Energy Astrophysics, Models of Stochastic processes in Cosmic Ray Physics and others at the Applied Mathematics and Physics departments. Recently he established a Space Education Center at the Yerevan Physics Institute. He was the supervisor of numerous undergraduate and graduate students' theses. 8 PhD thesis have been completed under his supervision.

Outside his field, Prof. Chilingarian has been interested in applying his data analysis methods to pattern recognition and genome analysis. He was awarded a research grant from the Civilian Research and Development Foundation (CRDF) to develop new methods of DNA micro-array data treating based on quantification of different types of gene expression in normal and tumor-affected tissues. The work culminated in a patent application by Utah's Huntsman Cancer Research Center.

Prof. Chilingarian has authored more than 300 scientific publications and served on many international scientific and editorial boards. He has been chairperson of several international conferences and given numerous presentations in the fields of high energy and cosmic ray physics and high-energy phenomena in atmosphere.

Currently he is Armenia's representative to COSPAR (the COMmission for SPace Research) and to the International Space Weather Initiative. He is the founder and spokesperson for the ANI and ASEC collaborations, and fellow of the American Physical Society, associate editor of the Space Weather and Space Climate (SWSC) journal.