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From Quarks to Air Showers: A Historic Review of the Development of the Simulation Program System ASICO, Results and Impact, and its Evolution to CORSIKA

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I set the scene with a brief presentation of the status of our knowledge of high energy cosmic rays and particle physics around 1960. This is followed by an overview of the quark hunt in the early 1960s, when it was believed that free quarks exist, and the search that was undertaken at the Niels Bohr Institute in Copenhagen in 1965, and elsewhere. Instead of quarks, the unexpected copious production of $N\bar{N}$ in air showers was discovered, which prompted me to develop what later on became the air shower simulation program system ASICO. I discuss briefly the contemporary shower and high energy hadronic interaction models, the sources of information to construct such models, the architecture of the initial cascade simulation process, and the first results. This is followed by an outline of the unique Echo Lake experiment, a landmark in cosmic ray physics, its results and the problem it caused. Subsequently, a series of significant discoveries and new theoretical developments of the epoch are summarized, which culminated in the coming into operation of the CERN ISR. This collider with its approximately 1800 GeV laboratory equivalent energy yielded an enormous wealth of new information and insight into a hitherto “uncharted” energy domain. Its results confirmed several cosmic ray discoveries and solved the Echo Lake problem. The presentation closes with a potpourri of results of ASICO after over twenty years of development, and its transition to CORSIKA.

Summary

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