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ASPEN WORKSHOP ON SUPERNOVA PHYSICS

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INTRODUCTION

The workshop on supernova Physics, planned before the explosion of SN 1987A, turned out to be the workshop on SN 1987A status upto 315 days after the explosion. About 60 participants, representing almost all the major groups involved in the theoretical modelling and observations of the event gathered in the beautiful surroundings of the Aspen ski slopes, during January 3-9, 1988. Since subsequent speakers will be reviewing the latest results on both the theory and observations of the SN 1987A, in the following only a brief summary of the highlights of the workshop is given, leaving the details to the other speakers.

While summarizing the optical observations of supernovae and of SN 1987A R.P.Kirshner emphasized the difference between the knowledge of supernovae, before and after the SN 1987A. Before the SN 1987A event, we had only theoretical models to go by, as far as the supernova phenomenon is concerned. This situation has dramatically changed after the explosion of SN 1987A, with the detection of neutrinos from the collapsing core of the presupernova star and the identification of the progenitor with the blue supergiant of B3 Ia spectral class. Thus the details of stellar evolutionary

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models leading to the supernova explosion and the explosive nucleosynthesis calculations could be directly checked. The importance of the visual observation of Jones giving the upper limit to the brightness of the exploding star in fixing the light curve was emphasized repeatedly by both the theorists and the observers. Further the spectroscopic observations almost from the start of the supernova explosion, as denoted by the neutrino detection, with the expansion velocities of the hydrogen and helium layers gave an opportunity to model the explosion properly. The neutrino results were presented by the IMB and Kamiokande groups, who emphasised the lack of detection of neutrinos at the time of reported Mont Blanc signal, although the Kamiokande detector was more sensitive than the Mont Blanc one. It was also emphasized that too much of fine splitting of the neutrino signals will not yield any significant new information, as the total number of events is very small.

The hard X ray results posed no problems for the radioactivity powered light curve models, but the soft X rays and especially the short term aperiodic variations, discovered a few days before the Aspen meeting, defy any explanation. During the meeting the detection of gamma ray lines from the SMM and balloon observations were reported. This came as the final proof of the explosive nucleosynthesis calculation of ^{56}Co. The line detection gave an opportunity to the Lick group to choose the proper model for the mixing in their evolutionary calculations. The important role the mixing plays in modelling the progenitor star as well as the explosion was emphasized by several speakers. The neutrinos' role in the explosion was highlighted by almost all the contributors. The role of rotation was pointed out by Ramadurai and Wilta. The neutrino signals as a means to verify particle physics predictions about neutrino mixing as well as its mass was emphasized by several groups. The summary talk by Dave Schramm outlined the major role played by SN 1987A in throwing much light on particle physics, stellar evolution theory and explosive nucleosynthesis.