THE PROPOSED DUMAND ARRAY CANNOT BE GREATLY IMPROVED UPON AS A DETECTOR OF EXTRATERRESTRIAL HIGH ENERGY NEUTRINOS

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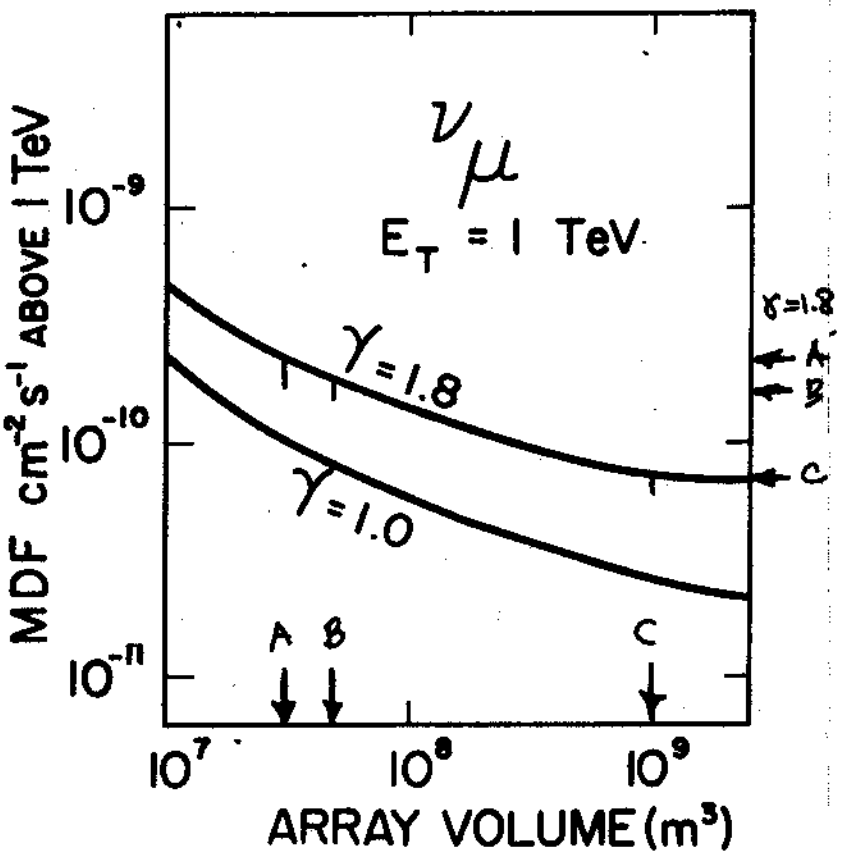
6 May 1982

This short note is to emphasize a point which has been made many times but still bears repeating. There is an impression that the proposed array is considerably less sensitive than the old 1978 Standard Array because it is only 1/30 km^3 instead of 1 km^3. This is true only for events inside the enclosed volume. Obviously the rate for these is down by a factor of 30 and it will take 30 years to do what the old array could do in one year with those events.

For neutrino astronomy the Minimum Detectable Flux is calculated using an energy-dependent volume of water surrounding the array. As we see in the enclosed figure, the MDF is a very slow function of volume. The proposed array, with 16" PMT's, is indicated by A. Using the same number of 20" PMT's spaced further apart we can increase the volume to 1/18 km^3, indicated by B. We see that this results in very little improvement for neutrino astronomy. Building a 1 km^3 array with tens of thousands of PMT's, at a cost of at least $100M, would improve the MDF no more than 2-3 times. The array may be "marginal", but so is the 1978 standard array.

The main impact of the smaller array is on high energy neutrino physics. As I showed in 1979, confirming what Arthur had earlier claimed, we could have detected the W-boson in the y-distributions. Now we cannot, in any reasonable time. Any physics that could previously have been done with the 1978 array involving only muon measurements, can still be done in about twice the time.



A PROPOSED DUMAND ARRAY $\frac{1}{30}$ km^3 16" PMT's

B SAME ARRAY (756 PMT'S) IF USE 20" PMT's $\frac{1}{19}$ km^3

C 1978 "STANDARD" 1 km^3 ARRAY 22,000 PMTS

Fig 1