MEMORANDUM to the SPSC CERN/SPSC 98-29, SPSC/M616

From: The TOSCA Collaboration.

Subject: 3-4 November Joint Meeting.

Date: October 7, 1998

In March 1997 the TOSCA collaboration submitted a Letter of Intent [CERN-SPSC/97-5, SPSC/I 213] to the SPSC. The subject matter was a short base-line search for $\nu_\mu \rightarrow \nu_\tau$ oscillations in the WANF beam. Following a suggestion by the SPSC [CERN/SPSC 97-13, SPSC 34] the TOSCA collaboration studied the feasibility of this experiment in the planned new neutrino beam to the Gran Sasso [NGS]. The result of this study was the subject matter of the Addendum to the TOSCA LOI [CERN-SPSC/98-20, SPSC/I 213 Add. 1] submitted earlier this year. This study concluded that, although running TOSCA in the WANF would be logistically easier, running it in the NGS would cause no insurmountable technical problem.

Since the above-mentioned addendum was sent to the SPSC only recently it was felt unnecessary to make another formal submission to the committee of the TOSCA physics program and capabilities. It seems evident to us though that TOSCA must be included in the discussion to be held at the forthcoming Joint Meeting (3-4 November 1998) on the future program of the NGS line. In addition we would like to point out, in this memo, a few issues to the committee.

1) The TOSCA collaboration is actively engaged in a re-assessment of the detector design in view of reducing its cost without affecting its performance. This has been prompted mostly by the fact that recent advances in emulsion scanning technology have resulted in much increased scanning speeds. The consequence is that the external tracker needed to predict the position of the tracks at the emulsion could be much simplified. This scenario is currently being investigated through simulations.

2) The reference beam for the NGS line has changed somewhat since our Addendum. We have therefore recalculated the sensitivity of TOSCA using the latest beam (Fig.1). For full mixing the reach in Δm^2 is now 0.04 eV^2.

3) It has recently been said that the NGS, if approved, would not be ready before mid-2004. This is one to two years later then originally foreseen. This now leaves several years during which the WANF beam could still run before the WANF hardware required for the NGS has to be removed and before the protons are needed for NGS operation. Furthermore since TOSCA would envisage running at a reduced SPS proton energy, some of the WANF shielding iron needed for early installation in the NGS line could be removed before or during WANF operation. During these extra years of WANF operation experiments in the West Area such as TOSCA or even in the Jura could use this most intense neutrino beam. It is also to be noted that from 2001 onwards, after the closure of LEP, the SPS cycle, developed by some of our TOSCA collaborators together with the accelerator divisions and described in our LOI, could be put into operation thus increasing even further the yearly neutrino flux.

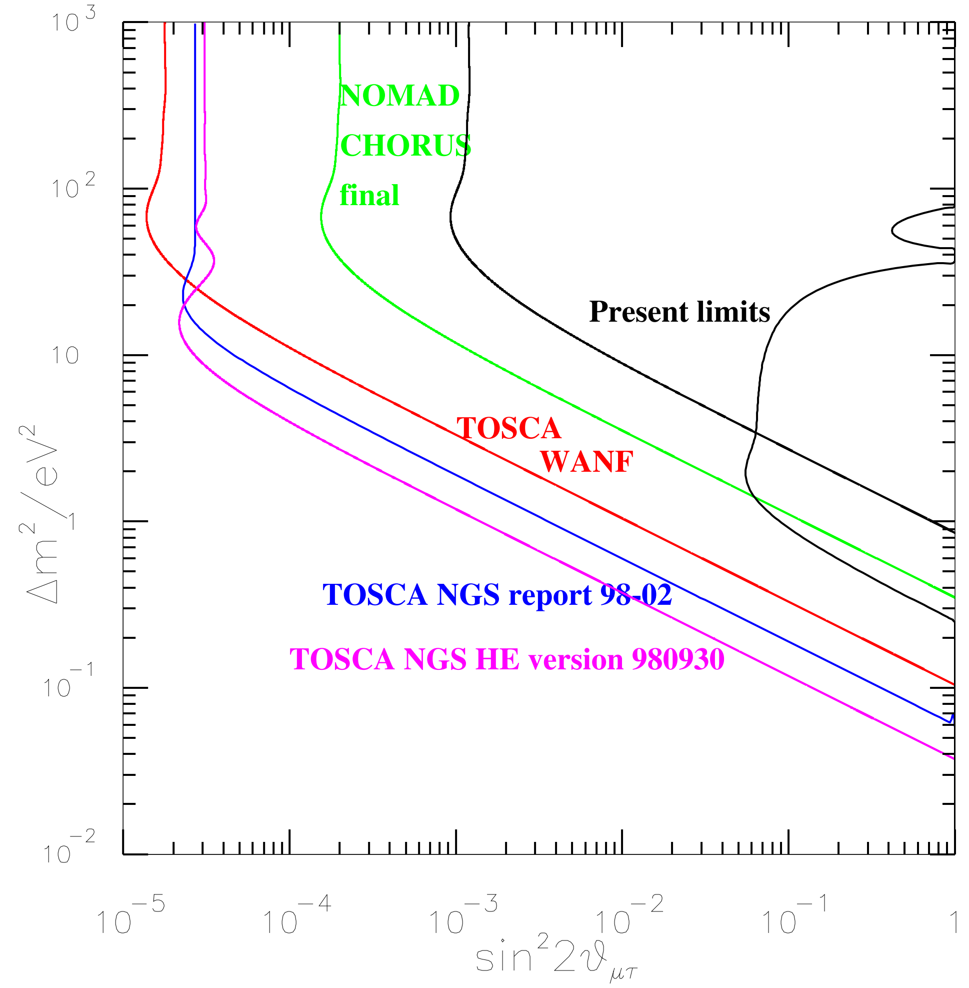

Figure 1: Revised sensitivity of TOSCA in the NGS beam using the new high energy option for the NGS to be adopted for the coming Joint Meeting of the SPSC and Gran Sasso committees (Nov 3-4, 1998) and posted on the Web on Sept 30, 1998 compared to the sensitivity shown in Addendum 1.