Study of sensitivities of the P2O project

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The sensitivities of the project to some oscillation parameters as a function of power and systematic errors are studied.

I. INTRODUCTION

P2O is the project of neutrino beam from IHEP Protvino to ORCA [1]

II. TECHNICAL NOTES ON THE REPOSITORY

The files for this project, including Papers and Notes, are kept in https://github.com/kirsanov-protvino/P2O . In order to work on them one should create account on github. Next step is to create an SSH key. Add this key to your account on the page https://github.com/settings/keys. After that you will be able to clone the repository using the command git clone git@github.com:kirsanov-protvino/P2O.git and push your changes in it. The command above is shown when you click the green button "Code" on the repository page and switch to SSH instead of HTTPS. To check that your repositiry clone is "pushable" type inside it "git remote -v".

III. TECHNICAL NOTES ON THE GLOBES PROGRAM RUNNING

In order to check that the statistics corresponds to the Proposal, the following call was used:
glbGetChannelRatePtr(0, ichannel, GLB_PRE). It returns the numbers of events in energy bins, to be summed over the them. It is to be called AFTER the calculation of sensitivities, otherwise some variables are not initialized. It is found that with the normalization factor 40 in the glb file the total number of events corresponds to the one in Figure 7 of the Proposal [1] (20000 $\nu_\mu CC$ events by eye from the figure).

IV. STUDY OF THE EXPERIMENT RESOLUTION

The value of $\sqrt{\chi^2}$ as a function of hypothetical δ for the two true values $\delta = \pi/2$ and $\delta = 3\pi/2$ is shown in Fig. 1. The energy resolution here is nominal, 30%, as specified in the Proposal.

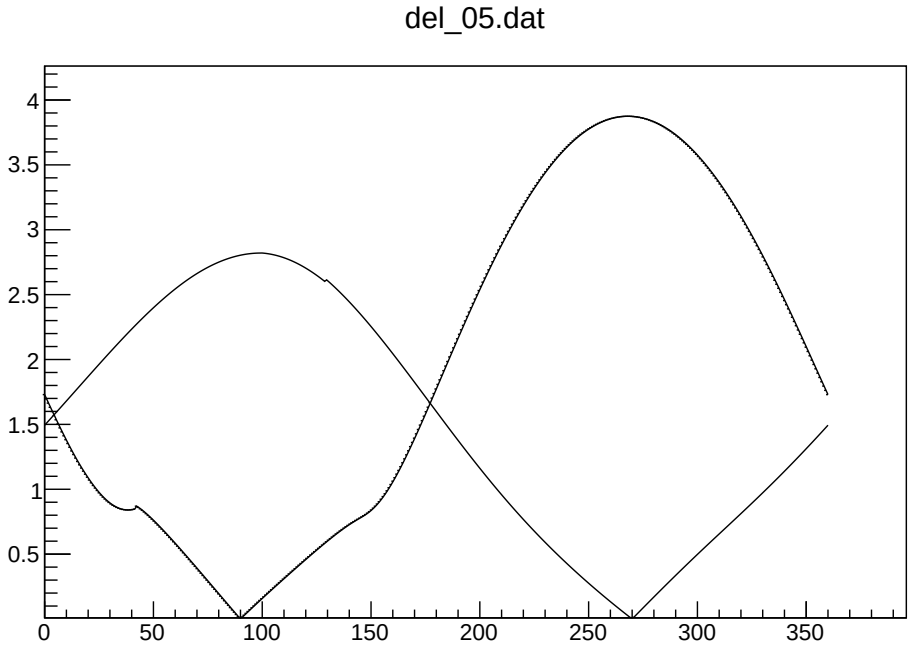

FIG. 1. Value of $\sqrt{\chi^2}$ as a function of hypothetical δ for $\delta = \pi/2$ and $\delta = 3\pi/2$. Energy resolution is 30%.

The resolution of δ measurement for the true value $\delta = \pi/2$ is shown in Fig. 2.

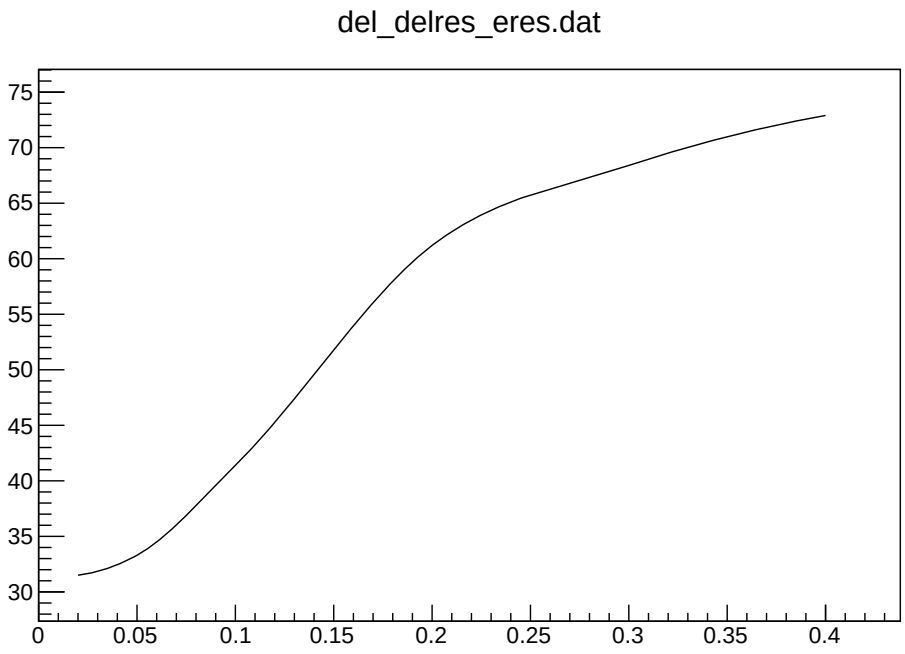

FIG. 2. Resolution of the δ measurement as a function of energy resolution

[1] A. V. Akindinov *et al.*, Eur. Phys. J. C **79**, 758 (2019), arXiv:1902.06083 [physics.ins-det].