

# Neutrino oscillation probability from a Jpp perspective

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# Neutrino oscillation probability

$$P(\nu_1 \rightarrow \nu_2) \equiv f(\sin^2\theta_{12}, \sin^2\theta_{23}, \sin^2\theta_{13}, \Delta m_{21}, \Delta m_{31}, \delta_{CP}; E_\nu, \cos\theta)$$

Is it possible to  
tabulate  $f(\sin^2\theta_{12}, \sin^2\theta_{23}, \sin^2\theta_{13}, \Delta m_{21}, \Delta m_{31}, \delta_{CP})$  and  
interpolate *a posteriori* between  $(E_\nu, \cos\theta)$ ?

# Jpp

```
typedef JMAPLIST< JMap,  
                 JMap,  
                 JMap,  
                 JMap,  
                 JMap,  
                 JMap,  
                 JMap,  
                 JMap>::maplist JMaplist_t;  
  
JMultiMap<double, double, JMaplist_t> zmap;
```

# 2D interpolator type

```
typedef JPolint0Function1D_t          JFunction1D_t;
typedef JFunction1D_t::abscissa_type  abscissa_type;
typedef JFunction1D_t::value_type     value_type;

typedef JMAPLIST<JPolint0FunctionalGridMap>::maplist  JMaplist1D_t;
typedef JMultiFunction<JFunction1D_t, JMaplist1D_t>  JFunction2D_t;
```

# 6D interpolator type – 2D return type

```
typedef JMap<abscissa_type, JCollection<value_type> > JMap2D_t;  
typedef JConstantFunction1D<abscissa_type, JMap2D_t> JCollection2D_t;  
  
typedef JMAPLIST<JPolint1FunctionalGridMap,  
                JPolint1FunctionalGridMap,  
                JPolint1FunctionalGridMap,  
                JPolint1FunctionalGridMap,  
                JPolint1FunctionalGridMap,  
                JPolint1FunctionalGridMap>::maplist JMaplist6D_t;  
  
typedef JMultiFunction<JCollection2D_t, JMaplist6D_t> JFunction6D_t;
```

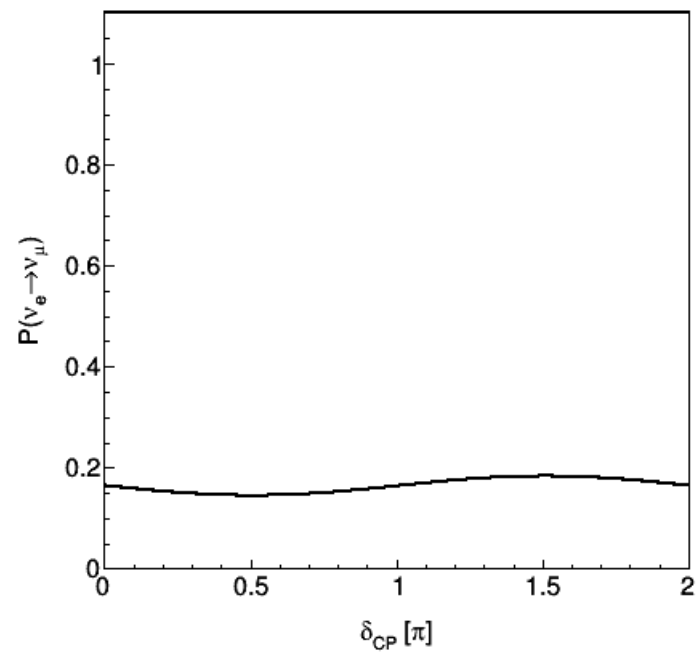
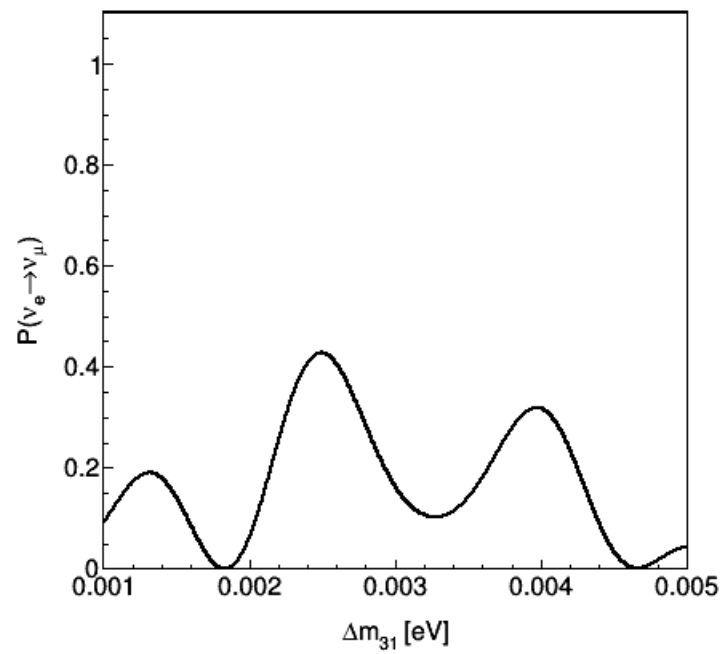
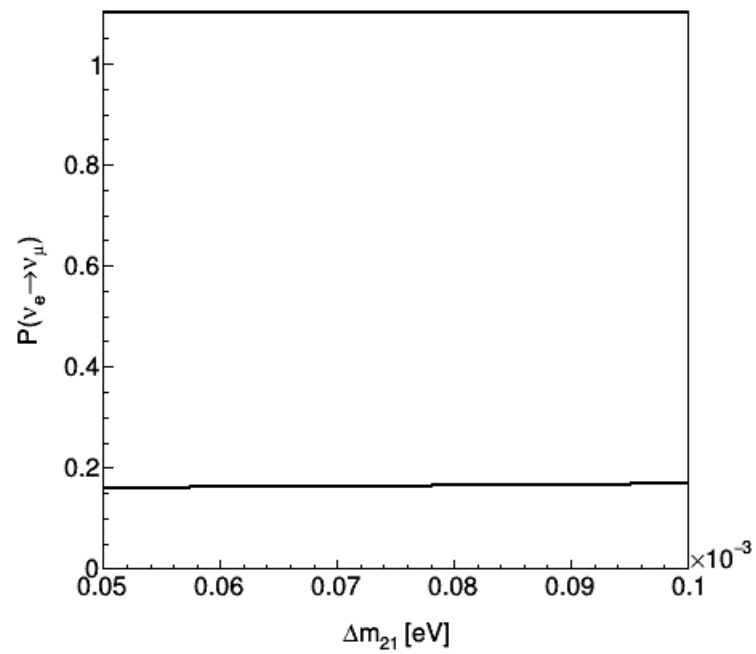
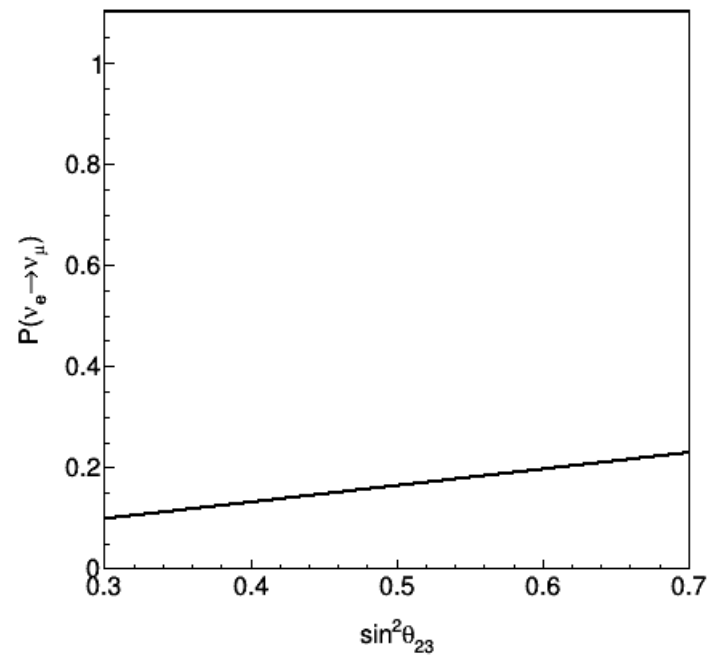
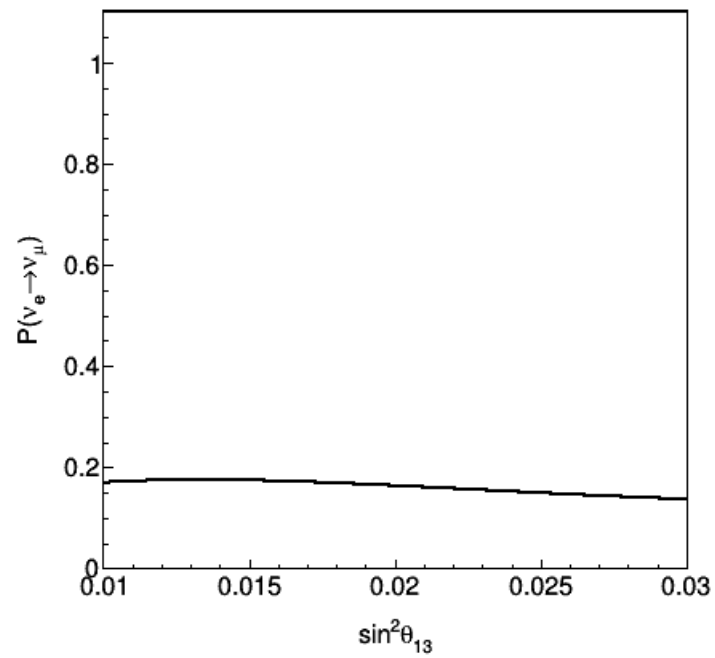
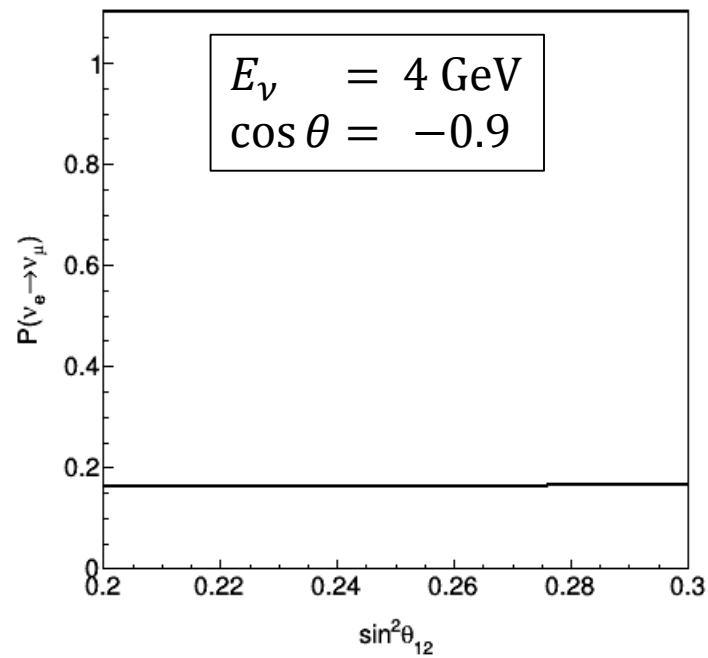
# CPU time

OscProb  
Get oscillation probability... OK  
9096  $\mu$ s elapsed

Jpp  
Get 8D-interpolation... OK  
575  $\mu$ s elapsed

Jpp  
Get 2D-function... OK  
854  $\mu$ s elapsed

Jpp  
Get 2D-interpolation... OK  
30  $\mu$ s elapsed



# Random point in neutrino parameter space

$\sin^2 \theta_{12}$	0.307
$\sin^2 \theta_{23}$	0.020
$\sin^2 \theta_{13}$	0.475
$\delta_{CP}$	1.775
$\Delta m_{21}$	7.61e-05
$\Delta m_{31}$	2.57e-03

