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## Neutrino Oscillations In Matter

*Monday 29 July 2019 14:00 (20 minutes)*

As long-baseline efforts are ramped up over coming years, it is important understand how the presence of matter affects neutrino oscillations. In this talk I will discuss precision oscillation probability formulas with matter effects. We have developed expressions that are simple, precise, and an actual expansion in the small parameters:  $\sin^2 \theta_{13}$  and  $\Delta m_{21}^2 / \Delta m_{31}^2$ . In addition, our expressions return to the exact expression in vacuum. I will also present some recent results on understanding CP violation in matter which show that the matter effect of the Jarlskog simply factorizes into atmospheric and solar contributions.

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