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An improved full reconstruction tool utilizing NeuroBayes

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The full reconstruction is an important tool for particle physics at the B factories. By fully reconstructing one of the two B mesons coming from the $\Upsilon(4S)$ resonance (tag side), the 4-momentum of the other B meson (signal side) is immediately known and all remaining tracks in the detector can be associated with this other B meson. The full reconstruction is therefore an important tool for the analysis of semileptonic and other rare B decays including neutrinos, while it can also be used for measuring inclusive branching ratios.

The new full reconstruction tool was developed for the Belle experiment at the KEK-B collider. The program was written from scratch, heavily utilizing the multivariate analysis software package NeuroBayes. With the addition of this more sophisticated

analysis technique and the addition of several reconstruction channels for the tag side, an improvement in efficiency of more than 100% could be achieved. Thus, the new full reconstruction enables many analyses to achieve an increase of a factor 2 in their signal sample.

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