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Measuring $b \rightarrow s\gamma$, $b \rightarrow d\gamma$ and $|V_{td}/V_{ts}|$ at BaBar

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We use the Upsilon(4S) dataset collected with the Babar detector at the PEP-II asymmetric e^+e^- storage ring to study the penguin decay modes. Here we report on a study of the radiative penguin decay $B \rightarrow X_s \gamma$ at BABAR using lepton-tagging to identify $B\bar{B}$ events. We present new results on the $B \rightarrow X_s \gamma$ branching fraction and direct CP asymmetry, based on a sample of 380 million $B\bar{B}$ pairs. We also present new results of a search for $B \rightarrow X_d \gamma$ decays. We consider seven final states with up to four charged pions and one neutral pion or η , which correspond to about 50% of the total X_d fragmentation in the mass range investigated. We observe for the first time a significant $b \rightarrow d \gamma$ transition in the hadronic mass range $M(X_d) > 1$ GeV, resulting in a significant improvement in the determination of $|V_{td}/V_{ts}|$ via the ratio of inclusive widths.

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Session Classification: 06 - CP violation, CKM and Rare Decays

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