



WAYNE STATE
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Inclusive B Decays

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Motivation

- Inclusive B Decay: $\bar{B} \rightarrow X_c l \bar{\nu}$, $\bar{B} \rightarrow X_u l \bar{\nu}$, $\bar{B} \rightarrow X_s \gamma$, $\bar{B} \rightarrow X_s l^+ l^-$
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Local OPE $\bar{B} \rightarrow X_c \ell \bar{\nu}$: α_s^2 , $\alpha_s \Lambda_{\text{QCD}}^2/m_b^2$, $\Lambda_{\text{QCD}}^3/m_b^3$, $\Lambda_{\text{QCD}}^4/m_b^4$, $\Lambda_{\text{QCD}}^5/m_b^5$

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- Large impact:
Top cited papers: CLEO #1 ($b \rightarrow s \gamma$ '95), Belle #3 ($b \rightarrow s \gamma$ '01)
Theoretical predictions: hundreds of citations

Present and Future

RED: USA BLUE: EUROPE

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Present: c_0 at $\mathcal{O}(\alpha_s)$ [Trott '04; Aquila, Gambino, Ridolfi, Uraltsev '05]

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Leading power NNLO $\mathcal{O}(\alpha_s^2)$ [Misiak et al. '07]

Λ_{QCD}/m_b corrections at $\mathcal{O}(\alpha_s^0)$ [Benzke, S. Lee, Neubert, GP '10]

Some $\Lambda_{\text{QCD}}^2/m_b^2$ corrections [Kaminski, Misiak, Poradzinski '12]

Some $\alpha_s \Lambda_{\text{QCD}}^2/m_b^2$ corrections [Ewerth, Gambino, Nandi '10]

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c_0 at $\mathcal{O}(\alpha_s)$ + first power corrections at $\mathcal{O}(\alpha_s^0)$

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- Serious problem: Leadership in *theory* shifting from **USA** to **Europe**
More funding needed for intensity frontier theory!