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A Precise Determination of the strong coupling from the Heavy Jet Mass Distribution

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Our work resolves a long-standing problem in particle physics: the inability for theory to agree with the spectrum of heavy-jet mass data, particularly at the Z-pole, leading to unreliable strong-coupling fits and exclusion of this high-quality experimental data. Our key theoretical improvements include high-precision large-log resummation in both the dijet and shoulder regions, a rigorous treatment of dijet non-perturbative corrections, and introducing a second non-perturbative parameter in the far tail. A crucial ingredient that leads to stable global fits is including —for the first time in this context—a theory covariance matrix for perturbative uncertainties.

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