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Three body open flavor decays of higher charmonium and bottomonium

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We study the Okubo-Zweig-Iizuka (OZI) allowed three body open flavor decay properties of higher vector charmonium and bottomonium states with an extended quark pair creation model. For the bottomonium system, we get that (i) the $BB\pi$ and $B^*B^*\pi$ partial decay widths of the $\Upsilon(10860)$ state are consistent with the experiment, and the $BB^*\pi$ partial decay width of the $\Upsilon(10860)$ state is smaller but very close to the Belle's experiment. Meanwhile, (ii) the $BB^*\pi$ and $B^*B^*\pi$ decay widths of $\Upsilon(11020)$ can reach $2 \sim 3$ MeV. In addition, (iii) for most of the higher vector charmonium states, the partial decay widths of the $DD^*\pi$ and $D^*D^*\pi$ modes can reach up to several MeV, which may be observed in future experiments.

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