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Contribution ID: **168** Type: **Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)**

(G*) Inclusive analysis of $B \to X_u \ell \nu_\ell$ and $|V_{ub}|$ determination at Belle II

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The Belle II experiment is a next-generation B-factory experiment located at the SuperKEKB e^+e^- collider, with the focus on examining the decays of $B\bar{B}$ meson pairs. The Belle II experiment started data taking in March 2019. It has since reached a world-record instantaneous luminosity of $2.4 \times 10^{34}\mathrm{cm}^{-2}\mathrm{s}^{-1}$, and has accumulated a total of $90.0\ \mathrm{fb}^{-1}$ to date. One of the main goals of the experiment is the precision measurement of the Cabbibo-Kobayashi-Maskawa (CKM) quark-mixing matrix elements. The V_{ub} element of the CKM matrix describes the coupling strength between u and b quarks. The semileptonic B meson decays of the type $B \to X_u \ell \nu$ play a critical role in the determination of $|V_{ub}|$. An inclusive untagged search for the $B \to X_u \ell \nu$ process at Belle II will be presented. Only the final state charged lepton is selected, while the final state meson and the companion B meson in the event are not reconstructed. The final state neutrino cannot be detected and manifests as missing energy in the event. This decay is suppressed compared to the decay with a charm quark in the final state, $B \to X_c \ell \nu$, which is the main background for this mode. Because the up quark is lighter than the charm quark, the leptons in the $B \to X_u \ell \nu$ decay can reach higher energies. This is exploited in the analysis by extracting the $B \to X_u \ell \nu$ yield in the momentum endpoint region of the charged lepton, where the $B \to X_c \ell \nu$ contributions are negligible. Reconstruction and background suppression methods will be presented, leading to a discussion of the current results and of the prospects for this measurement with the Belle II experiment.

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