

Exponential Inequalities via Exchangeable Pair Approach

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Let (W, W') be an exchangeable pair with $E(W - W'|W) = g(W)$, and let $v(W) = E(|(g(W) - g(W'))(W - W')| | W)$. Assume that there exist $c_0, c_1 \geq 0, c_2 \geq 1$ such that $P(v(W) \geq c_0 + t) \leq c_2 e^{-t/c_1}$ for $t \geq 0$. In this talk we shall prove that

$$P(g(W) \geq t) \leq \exp\left(-\frac{t^2}{2\tau + 4t\sqrt{2c_1}}\right),$$

where $\tau = c_0 + c_1 \log(4c_2)$. An application to Curie-Weiss model will also be discussed.