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## *Presentation Title*

### **An Optimal Distributionally Robust Auction**

#### ***Abstract***

An indivisible object may be sold to one of  $n$  agents who know their valuations of the object. The seller would like to use a revenue-maximizing mechanism but her knowledge of the values' distribution is scarce: she knows only the means (which may be different) an upper bound for valuations. Valuations may be correlated. Using a constructive approach based on duality, we prove that a mechanism that maximizes the worst-case expected revenue among all deterministic dominant-strategy incentive compatible, ex post individually rational mechanisms takes the following form: (1) the bidders submit bids  $b_i$ ; (2) for each bidder, a linear score  $s_i = \beta_i b_i - \alpha_i$  is calculated where  $\alpha_i, \beta_i$  are fixed bidder-specific parameters; (3) the object is awarded to the agent with the highest score, provided it's nonnegative; (4) the winning bidder pays the minimal amount he would need to bid to still win in the auction. The set of optimal mechanisms includes other mechanisms but all those have to be close to the optimal linear score auction in a certain sense. When means are high, all optimal mechanisms share the linearity property. Second-price auction without a reserve is an optimal mechanism when the number of symmetric bidders is sufficiently high.

#### ***Keywords***

Robust Mechanism Design, Worst-case objective, Auctions, Moments problems, Duality

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