Catalytic Enantioselective \( \gamma \)-Alkylation of Carbonyl Compounds

**Significance:** The authors describe a new method for the catalytic enantioselective \( \gamma \)-(and \( \delta \))-alkylation of carbonyl compounds by cross-coupling of \( \gamma \)-(and \( \delta \))-haloamides with alkylboranes. The reaction is catalyzed by nickel and uses a commercially available chiral diamine ligand to achieve high enantiomeric excess.

**Comment:** The reaction conditions tolerate alkyl chlorides as well as alkyl bromides as suitable electrophilic cross-coupling partners. Also, an aryl metal, a boronate ester, and a secondary alkyl metal compound are able to undergo the stereo-selective cross-coupling with good enantiomeric excess.

**Selected examples:**

- \( \text{Ph}_2\text{N} \) \( \text{O} \) \( \text{O} \) \( \text{Ph}_2\text{N} \)
  - 63% yield
  - 85% ee

- \( \text{Ph}_2\text{N} \) \( \text{O} \) \( \text{Et} \)
  - 80% yield
  - 89% ee

- \( \text{Ph}_2\text{N} \) \( \text{O} \) \( \text{n-Bu} \)
  - 64% yield
  - 90% ee

- \( \text{Me} \) \( \text{N} \) \( \text{OMe} \) \( \text{Et} \)
  - 75% yield (with 25% KI)
  - 86% ee

- \( \text{Ph}_2\text{N} \) \( \text{O} \) \( \text{Et} \)
  - 74% yield
  - 91% ee

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