

# Constellation Rearrangement in Cooperative Relay-HARQ Network

**Abstract**—We study the constellation rearrangement (CoRe) problem in a relay-HARQ network to achieve symbol mapping diversity for reliable communication. Specifically, we formulate the bit error rate (BER) maximization into a quadratic three-dimensional assignment problem (Q3AP) and make use of the recent development of numerical method to find the optimal CoRe solution. Performance gains on various channel settings are demonstrated with simulations.

## I. INTRODUCTION

## II. SYSTEM MODEL AND PROBLEM FORMULATION

## III. OPTIMAL CONSTELLATION REARRANGEMENT

[1]

A. *BER Maximization via Q3AP solution*

B. *Computation of the Pair-wise Symbol Rate*

C. *Q3AP Solution*

## IV. NUMERICAL RESULTS

## V. CONCLUSION

## REFERENCES

- [1] H. L. Koch, "Some personality correlates of sex, sibling position, and sex of sibling among five-and six-year-old children." *Genetic Psychology Monographs*, 1955.