1046-94-685   **Mark F. Flanagan** (`mark.flanagan@ieee.org`), Winterthurerstrasse 190, CH-8057 Zurich, Switzerland, **Vitaly Skachek*** (`vitaly.skachek@ucd.ie`), CASL, Belfield, Dublin 4, Ireland, **Eimear Byrne** (`ebyrne@ucd.ie`), Belfield, Dublin 4, Ireland, and **Marcus Greferath** (`marcus.greferath@ucd.ie`), Belfield, Dublin 4, Ireland. *Polytope Representations for Linear-Programming Decoding of Nonbinary Linear Codes.*

The decoding of binary LDPC codes using linear-programming decoder was proposed by J. Feldman *et al.* The connections between linear-programming decoding and classical belief-propagation decoding were established in that paper. In our work, we extend the above approach to coded modulations, in particular to codes over rings mapped to nonbinary modulation signals. In both cases, the principal advantage of the linear-programming framework is its mathematical tractability.

For the binary coding framework, alternative polytope representations were studied, which give a complexity advantage in certain scenarios. In this work, we define two alternative polytope representations, which offer a smaller number of variables and constraints for many classes of nonbinary codes. These polytope representations, when used with the respective nonbinary LP problems, lead to polynomial-time decoders for a wide variety of classical nonbinary codes. (Received September 10, 2008)