1086-94-1294 **Ido Tal** (ital@mail.ucsd.edu), 9500 Gilman Dr, La Jolla, CA 92093, and **Alexander Vardy*** (avardy@ucsd.edu), 9500 Gilman Dr, La Jolla, CA 92093. *On list decoding of polar codes.*

The discovery of polar codes is widely regarded as one of the major breakthroughs in coding theory in the past decade. These codes provably achieve the capacity of any discrete memoryless symmetric channel, with low encoding and decoding complexity. However, it has been observed empirically that polar codes do not perform as well as, say, turbo codes or LDPC codes at short and moderate code lengths. Thus a key problem in the theory of polar codes is that of improving their performance at such length. We observe that significant gains can be attained using a list-decoding algorithm for polar codes along with a subtle modification of the code structure. The algorithm retains the desirable properties of the conventional decoder, such as low complexity and recursive implementation. In practice, simulations on the binary-input Gaussian channel (and other channels) show that, already at length 1024, list decoding of polar codes can outperform the best-known LDPC codes. In theory, list decoding of polar codes raises many challenging open problems. (Received September 20, 2012)