1086-14-2709 **Sarah E. Anderson***, sarah5@g.clemson.edu, and **Gretchen L. Matthews**. *Rates of polarization of polar codes constructed using algebraic geometry code kernels.*

In recent groundbreaking work, Arikan developed polar codes as an explicit construction of symmetric capacity achieving codes for binary DMCs with low encoding and decoding complexity. In this construction, a kernel matrix

$$G = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$$

is considered, and $G^{\otimes n}$ is used to encode a block of 2^n channels. As the number of channels grows, each channel becomes either a noiseless channel or a pure-noise channel, and the rate of this *polarization* is related to the kernel matrix used. Since Arikan's original construction, polar codes have been expanded to q-ary DMCs, where q is a power of a prime, and other matrices besides G have been considered as kernels. Algebraic geometry code kernels were first considered by Mori and Tanaka and Korada and Şaşoğlu using Reed-Solomon and BCH codes as kernels. In our work, we implement more general constructions with algebraic geometry codes as kernels. While Mori and Tanaka showed Reed-Solomon kernels give the best possible exponent for kernels of size $l \leq q$, we show that considering larger matrices from algebraic geometry codes over $\mathbb{F}_q$ yields better exponents meaning better rates of polarization. (Received September 25, 2012)