1163-13-215 **Eric Swartz** and **Nicholas Werner*** (wernern@oldwestbury.edu). *Covering Numbers of Commutative Rings.*

A cover of a unital, associative ring R is a collection of proper subrings of R whose set-theoretic union equals R. If such a cover exists, then the covering number $\sigma(R)$ of R is the cardinality of a minimal cover. In this paper, we show that if R has a finite covering number, then the calculation of $\sigma(R)$ can be reduced to the case where R is a finite ring of characteristic p and the Jacobson radical J of R has nilpotency 2. A ring R is called σ-elementary if $\sigma(R) < \sigma(R/I)$ for every nonzero two-sided ideal I of R. We classify all commutative σ-elementary rings with a finite covering number. Using this, we prove that if R has a finite covering number and R/J is commutative, then either $\sigma(R) = \sigma(R/J)$, or $\sigma(R) = p^d + 1$ for some $d \geq 1$. In particular, this result characterizes the integers that occur as the covering number of a commutative ring. This is joint work with Eric Swartz. (Received August 27, 2020)