Non-unique factorizations in rings of integer-valued polynomials

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Let D be a domain with quotient field K. The ring of integer-valued polynomials on D,

$$\mathrm{Int}(D) = \{f \in D[x] \mid \forall a \in D, f(a) \in D\}$$

in general does not have unique factorization of elements.

In this talk, we discuss non-unique factorizations in $\mathrm{Int}(D)$ where D is a Dedekind domain with infinitely many maximal ideals of finite index.

We present two main results. First, for any finite multiset N of natural numbers greater than 1, there exists a polynomial $f \in \mathrm{Int}(D)$ which has exactly $|N|$ essentially different factorizations of the prescribed lengths. In particular, this implies that every finite non-empty set N of natural numbers greater than 1 occurs as a set of lengths of a polynomial $f \in \mathrm{Int}(D)$. Second, we show that the multiplicative monoid $(\mathrm{Int}(D) \setminus \{0\}, \times)$ of $\mathrm{Int}(D)$ is not a transfer Krull monoid.