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Melanie Matchett Wood and **Ravi Vakil*** (vakil@math.stanford.edu). *From combinatorics to motives: Cutting and pasting in algebraic geometry.*

Given some class of "geometric spaces", we can make a ring as follows.

- (i) (*additive structure*) When U is an open subset of such a space X , $[X] = [U] + [(X \setminus U)]$;
- (ii) (*multiplicative structure*) $[X \times Y] = [X][Y]$.

In the algebraic setting, this ring (the "Grothendieck ring of varieties") contains surprising structure, connecting geometry to arithmetic and topology. I will discuss some remarkable statements about this ring (both known and conjectural), and present new statements (again, both known and conjectural). A motivating example will be polynomials in one variable. The key to these results is understanding the combinatorial structure related to "symmetric powers".

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