Unions of line in finite fields

Q: Given a collection of lines in Euclidean space, how "large" can their union be?

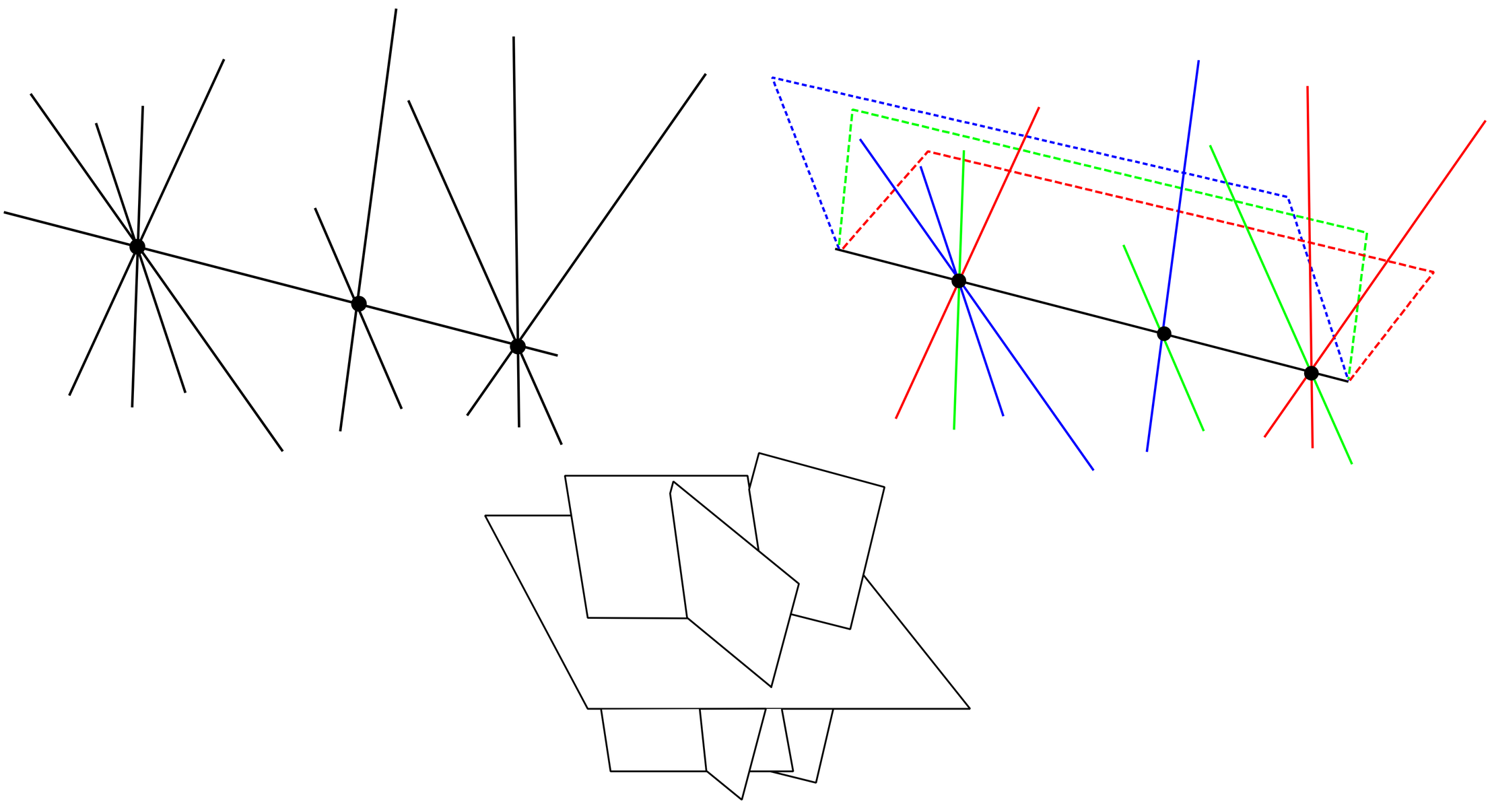
Model Problem: "Euclidean" ➔ ❽Vector Space over a finite field"

Conjecture: If $\dim(\text{collection}) \geq 2(d-1) + \beta$ then $\dim(\text{union}) \geq d + \beta$

Progress: Proved conjecture for finite fields. Conjecture is sharp, so no further progress possible on model problem.

Further Work: Can results for the model problem be extended to Euclidean space?

Possible Obstruction: Idealized lines intersect in a single point. Approximate lines that are almost parallel can intersect in large regions.



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