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curve tangencies and maximal functions

I will discuss a class of maximal operators that arise from averaging functions over thin neighborhoods of curves in the plane. Examples of such operators are the Kakeya maximal function and the Wolff and Bourgain circular maximal functions. To understand the behavior of these operators, we need to study the possible intersection patterns for collections of curves in the plane: how often can these curves intersect, how often can they be tangent, and how often can they be tangent to higher order?