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The Corona Problem on the Polydisk

In this talk, we study the Corona problem for the Banach algebra  $H^{\infty}(\mathbb{D}^n)$  of bounded holomorphic functions on the polydisk  $\mathbb{D}^n \subset \mathbb{C}^n$ . In this setting, the Corona problem asks whether the polydisk  $\mathbb{D}^n$  is dense in the Gelfand topology in the maximal ideal space of  $H^{\infty}(\mathbb{D}^n)$ .

We discuss certain cases of the Corona problem on the polydisk and present new necessary and sufficient conditions under which the problem can be solved. Our method is based on a new result concerning the solution of special  $\bar{\partial}$  equations on a polydisk. This is joint work with Alex Brudnyi.