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***Embedding Banach algebras into algebras of formal power series***

ABSTRACT. Graham Allan achieved a striking and well known result when he developed necessary and sufficient conditions for embedding algebras of formal powerseries into a general Banach algebra. This has become the starting point for much further work. In this talk, which covers some joint work with H.G. Dales and S.R. Patel, we consider the problem the other way round, considering when one can embed a general Banach algebra (or Fréchet algebra, or even F-algebra) into an algebra of formal powerseries. If we embed a Fréchet algebra, and if the algebra of formal powerseries is the usual Fréchet algebra  $\mathbb{C}[[X]]$ , and if the embedding is continuous and has dense range, then our algebra is called a FAPS or “Fréchet Algebra of Power Series”. We shall show that the continuity condition is unnecessary. As a corollary, we find that every FAPS has a unique F-algebra topology (indeed, every F-algebra which can be algebraically embedded in  $\mathbb{C}[[X]]$  has a unique F-algebra topology, and the embedding is automatically continuous). The uniqueness of the topology further develops work by R.J.Loy on uniqueness of norm for Banach algebras.

Discussions along these lines always skirt the *Michael Problem*, and we shall note that a well known test case for the Michael Problem - the Fréchet algebra of entire analytic functions on  $c_0$  - is in fact a FAPS, so the natural question of whether characters are automatically continuous on a Fréchet algebra which is a FAPS, is the Michael problem itself in disguise.

The Michael problem is the most prestigious of several unsolved problems in the area, which we shall discuss.