We will answer a question raised by Ronald Douglas in connection with his work on a conjecture in operator theory due to William Arveson. Let \( S \) denote the unit sphere in \( \mathbb{C}^n \). If \( A \) is a function algebra on \( S \) that contains the ball algebra \( A(S) \) and whose maximal ideal space is \( S \), and if \( A \) is invariant under the action of the \( n \)-torus on \( S \), does it follow that \( A = C(S) \)?

When \( n = 1 \), Wermer’s maximality theorem gives immediately that the answer is yes. Surprisingly, in higher dimensions the answer depends on the dimension. The proof is related to a peak point theorem of John Anderson and the speaker and counterexamples to the peak point conjecture due to Richard Basener and the speaker.

We will also present a conjecture of a more general nature concerning function algebras that are invariant under a transitive group action, and we will prove the conjecture under a mild additional hypothesis.