Circles in the spectrum and numerical ranges

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We prove that a bounded linear Hilbert space operator has the unit circle in its essential approximate point spectrum if and only if it admits an orbit satisfying certain orthogonality and almost-orthogonality relations.

As consequences, we derive in particular wide generalizations of Arveson's theorem as well as show that the weak convergence of operator powers implies the uniform convergence of their compressions on an infinite-dimensional subspace.

This is a joint work with YURI TOMILOV (Nicolaus Copernicus University and Polish Academy of Sciences).