

The bispectral problem stems from the research of Cl. Shannon, while coming up with a mathematical foundation for Communication Theory. In the first rigorous mathematical setting the problem was addressed by J.J. Duistermaat and F.A. Grunbaum in 1986. The problem asks for differential operator $L(x, \partial_x)$, which possesses a family of eigenfunctions $\psi(x, z)$, with eigenvalue $f(z)$, such that $\psi(x, z)$ are eigenfunctions of another operator $\Lambda(z, \partial_z)$, but this time in the spectral parameter z . While at the beginning the problem seemed isolated in the other research, today we know its connections with integrable systems, representation theory, Calogero-Moser particle systems, noncommutative geometry, etc.

The talk will be an introduction to the problem and will survey first steps of classification of bispectral operators and some of the above mentioned connections.