1056-65-1148   **Hans Z Munthe-Kaas*** (`hans@math.uib.no`), Johannes Bruns gt. 12, N-5008 Bergen, Norway.
On applications of non-commutative Fourier analysis in computational science.

Classical Fourier analysis deals with analysis and computational techniques for Linear Translation Invariant operators, i.e. linear operators commuting with shifts on Abelian groups, such as R^n, $R^n/2\pi Z$, Z and Z/NZ and products of these. More generally, Fourier analysis on groups deals with linear operators commuting with shifts on non-commutative groups. Here (matrix valued) group representations replaces exponentials in the classical Fourier analysis.

In this talk we will discuss various problems in computational mathematics where ideas of non-commutative harmonic analysis plays a central role. In particular we will discuss symmetry based techniques for computational linear algebra (matrix exponentials, eigenvalue computations and linear solvers) as well as recent developments of multivariate Chebyshev polynomials in approximation theory. These polynomials are closely associated with affine Weyl groups and share most of the beautiful properties of the classical univariate Chebyshev polynomials.

The talk is aimed at a general mathematical audience. We will present central ideas, applications and open problems. (Received September 21, 2009)