Mathematics Colloquium
at Jacobs University Bremen

Maurice de Gosson

(Universität Wien and Jacobs University Bremen)

will speak on

Hardy's Uncertainty Principle: Symplectic Formulation

Date: **Monday, February 19, 2007**
Time: **17:15**
Place: **Lecture Hall Research II, IUB**

Abstract:

Hardy's uncertainty principle says that if $\psi \in L^2(\mathbb{R})$ satisfies inequalities

$$|\psi(x)| \le C_X \, e^{-\frac{a}{2\hbar}x^2} \quad \text{and} \quad |\mathcal{F}\psi(p)| \le C_P \, e^{-\frac{b}{2\hbar}p^2}$$

then: (i) If $ab = 1$, there exists $C \in \mathbb{C}$ such that $\psi(x) = Ce^{-\frac{a}{2\hbar}x^2}$. (ii) If $ab > 1$, then ψ vanishes identically. (iii) If $ab < 1$ then the set of functions satisfying the inequalities above is non-empty.

The aim of this talk is to apply Hardy's uncertainty principle to the Wigner distribution, and more generally to the density operators of quantum mechanics. We will express our results in terms of the symplectic capacity of the Wigner ellipsoid associated to the density operator, which makes apparent interesting connections between the uncertainty principle of quantum mechanics and recent advances in symplectic topology.

Colloquium Tea at ca. 16:45 in the Tea Room of Research II, close to the lecture hall. Everybody is welcome!

M. Stoll