UNIWERSYTET ŚLĄSKI
W KATOWICACH

REKTOR
UNIWERSYTETU ŚLĄSKIEGO W KATOWICACH

SERDECZNIE ZAPRASZA
NA

XIV WYKŁAD IM. PROFESORA ANDRZEJA LASOTY

PROFESSOR PIERANGELO MARCATI

GRAN SASSO SCIENCE INSTITUTE L'AQUILA - ITALY

TITLE:

MATHEMATICAL CHALLENGES IN THE THEORY OF QUANTUM FLUIDS

IN THIS LECTURE WE WILL DISCUSS A RESEARCH FIELD THAT BRINGS TOGETHER PROBLEMS WITH STRONG MOTIVATION IN QUANTUM PHYSICS AND MATHEMATICAL TECHNIQUES BORN IN THE FIELD OF HARMONIC ANALYSIS AND USED FOR THE ANALYSIS OF DISPERSING PHENOMENA. IN PARTICULAR, THE DESCRIPTIONS THAT USE EFFECTIVE EQUATIONS OF THE NON-LINEAR SCHRÖDINGER TYPE (GROSS-PITAEVSKII) HAVE A FORMULATION OF A FLUID-DYNAMIC NATURE. WE WILL DEMONSTRATE A MATHEMATICALLY RIGOROUS THEORY THAT JUSTIFIES THESE CONNECTIONS AND POSES NEW MATHEMATICAL CHALLENGES. IN CONCLUSION, WE WILL MENTION HOW SOME IDEAS OF DYNAMICS ON FRACTALS, WHICH WERE ONE OF ANDREZEJ LASOTA'S TOPICS OF INTEREST, CAN FIND APPLICATION IN THE STUDY OF QUANTUM TURBULENCE.

WYKŁAD ODBĘDZIE SIĘ 14 STYCZNIA 2022 ROKU O GODZINIE 14.00, W AULI IM. KAZIMIERZA LEPSZEGO W BUDYNKU REKTORATU UŚ PRZY UL. BANKOWEJ 12 W KATOWICACH.

Streszczenia /Summary

Pierangelo Marcati

"Mathematical challenges in the theory of quantum fluids"

In this lecture we will discuss a research field that brings together problems with strong motivation in quantum physics and mathematical techniques born in the field of harmonic analysis and used for the analysis of dispersing phenomena. In particular, the descriptions that use effective equations of the non-linear Schrödinger type (Gross-Pitaevskii) have a formulation of a fluid-dynamic nature. We will demonstrate a mathematically rigorous theory that justifies these connections and poses new mathematical challenges. In conclusion, we will mention how some ideas of dynamics on fractals, which were one of Andrzej Lasota's topics of interest, can find application in the study of quantum turbulence.