BRÅKET

Information om seminarier och högre undervisning i matematiska ämnen i Stockholmsområdet

BRÅKET

Trevlig sommar

önskas Bråkets läsare. Nästa nummer av Bråket planeras utkomma fredagen den 16 augusti.

SEMINARIER

Fr 06−14 kl. 9.15. Seminarium i finansiell matematik. *(Observera dagen och tiden!)* **Marie-Claude Saisse** presenterar sitt examensarbete: *Modelling the Time-Varying Risk Premium in a CAPM Framework.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 2.

Fr 06−14 kl. 10.15. Seminarium i finansiell matematik. *(Observera dagen och tiden!)* **Benoît Riquet** presenterar sitt examensarbete: *Elliptical distributions in risk management.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 2.

Fr 06−14 kl. 10.15. Seminarium i fysik. Thomas K. Mattsson, Sandia National Laboratories, Albuquerque, USA: *Density functional theory at the edge: Vacancy formation energies to a new level of accuracy; uncovering the low-barrier Si ad-dimer diffusion mechanism on Si(001) by its electric field dependence.* Seminarierummet, hus 11, Roslagstullsbacken 11, Stockholms centrum för fysik, astronomi, bioteknik (SCFAB, AlbaNova). Se sidorna 2−3.

Fr 06−14 kl. 11.15. Seminarium i finansiell matematik. *(Observera dagen och tiden!)* **Lars Karlsson** presenterar sitt examensarbete: *GARCH-Modelling: Theoretical Survey, Model Implementation and Robustness Analysis.* Seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se sidan 3.

Fr 06−14 kl. 13.15. Seminarium i algebraisk geometri. *(Observera dagen och lokalen!)* **Nivaldo Nunes De Medeiros,** MIT, USA: *Limit canonical systems on curves with two components.* Seminarierum 3721, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7. Se Bråket nr 22 sidan 3.

SEMINARIUM I FINANSIELL MATEMATIK
Marie-Claude Saisse

presenterar sitt examensarbete:

Modelling the Time-Varying Risk Premium in a CAPM Framework

Abstract: The objective of this thesis is to model the time-varying risk premium in a CAPM framework for the Swedish market. The CAPM strong result states the expected risk premium of an asset to be proportional to its covariance with the market. The CAPM gives only information about the expectation of the risk premium but not on its volatility. ARCH/GARCH models have been widely used to model volatility as they are able to capture some interesting features of the latter such as heteroskedacticity or leptokurtosis. However, these models are not perfect and they particularly do not take into account the asymmetric effect of positive shock versus negative shocks. In this study, the Swedish market is taken as made of an equity and a bond index. Three models have been studied for the risk premium: a constant volatility model, a GARCH in mean, and an LSTGARCH in mean, the latter taking asymmetric effects into account.

Tid och plats: Fredagen den 14 juni kl. 9.15 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

SEMINARIUM I FINANSIELL MATEMATIK
Benoît Riquet

presenterar sitt examensarbete:

Elliptical distributions in risk management

Abstract: It is of great importance for risk managers to be able to model the log-returns of financial assets. Traditionally, these are assumed to have a multivariate normal distribution because of its interesting properties. However, this distribution is not able to capture all the phenomena observed in the financial world, such as extreme events (heavy-tails or large shocks that seem to occur simultaneously on the market for different assets). A natural extension of the multivariate normal distribution is the class of elliptical distributions. The latter share many properties with the multivariate normal distribution but can also catch extreme events. In this paper, we explore elliptical distributions, find and compare estimators of their parameters and derive a test for elliptical symmetry of a sample of data.

Tid och plats: Fredagen den 14 juni kl. 10.15 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.

SEMINARIUM I FYSIK

Thomas K. Mattsson: Density functional theory at the edge: Vacancy formation energies to a new level of accuracy; uncovering the low-barrier Si ad-dimer diffusion mechanism on Si(001) by its electric field dependence

Abstract: Density functional theory (DFT) is the workhorse of today's computational materials physics. Many properties of materials are calculated to high accuracy. However, fundamental questions still remain. I will discuss two topics, both of which highlight the need for a better understanding of the exchange-correlation functionals currently in use, as well as the need for improved functionals.

- How to calculate the seemingly basic property, vacancy formation energy of metals, accurately and consistently?
- How to determine the atomic mechanism behind ad-dimer diffusion on Si(001)?

The predictive power of first-principles calculations of vacancy formation energies in metals (Pt, Pd, Mo) is taken to a new level by the addition of the intrinsic surface error in DFT. Density functional theory, contrary to previous calculations, underestimates the vacancy formation energy when structural relaxation is included. This is the case for both the local density- and generalized gradient approximations for the exchange-correlation energy. With corrections for the intrinsic surface error we reach excellent agreement between the two exchange-correlation functionals as well as with experimental data.

Surface diffusion and reactions occur on a picosecond time scale, making direct observation of their atomic mechanisms difficult. Yet, understanding these processes is necessary to control the evolution of surfaces at the nanoscale. We show that the electric field dependence of barriers for surface diffusion and other surface processes can be used to discriminate between different proposed atomic mechanisms. Using density functional theory calculations, we show that "piecewise diffusion", the previously accepted atomic mechanism for ad-dimer diffusion on Si(001), where the ad-dimer partly splits during the transition, has the opposite field-dependence to what is observed. It therefore cannot be the dominant mass-transport mechanism. We describe an alternate process, wherein the ad-dimer "walks" along the dimer row, combining rotational and translational motions. This process has a low barrier at zero electric field and a field dependence in agreement with measurements. This approach, comparing the measured and calculated effects of an electric field, is not limited to diffusion on semiconductors, but can also be used to study e.g. dissociative adsorption barriers. Thus, the electric field in a scanning probe should not be considered a nuisance which is to be corrected for by extrapolating results to zero field, but instead a tool that helps us study states otherwise invisible.

Tid och plats: Fredagen den 14 juni kl. 10.15 i seminarierummet, hus 11, Roslagstullsbacken 11, Stockholms centrum för fysik, astronomi, bioteknik (SCFAB, AlbaNova).

SEMINARIUM I FINANSIELL MATEMATIK

Lars Karlsson

presenterar sitt examensarbete:

GARCH-Modelling:
Theoretical Survey, Model Implementation and Robustness Analysis

Abstract: In this thesis we survey GARCH modelling with special focus on the fitting of GARCH models to financial return series. The robustness of the estimation of the parameters in the model is examined with three different distributional assumptions for the innovations; the Gaussian distribution, the Student t distribution, and the GED (Generalized Error Distribution). Both the Student t distribution and the GED have fat tails. The maximum likelihood approach is used for the parameter estimation. Using backtesting, the related residuals under the three different distributional assumptions are examined. Furthermore, some fundamental concepts of financial time series analysis will be explained and some "stylized facts" of real returns will be examined.

Tid och plats: Fredagen den 14 juni kl. 11.15 i seminarierum 3733, Institutionen för matematik, KTH, Lindstedtsvägen 25, plan 7.