LOFAR Carpathian Mountain (CM) station

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Ukrainian Carpathian mountains

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LOFAR-CM concept

- Ukrainian-Austrian project
  - Ukraine provides the land and infrastructure
  - Austria provides for the LOFAR antennas
- LOFAR station with LBH antennas, 30--80 MHz
- Due to our scientific objectives no HBA are planned
- Frequency extension down to 10 MHz
- Low frequency range antennas needed
- Supports LSS (frequency range 10—30 MHz should be included in the LOFAR-CM station)

LOFAR-CM antennas and pre-amplifiers

- LOFAR LBH antennas not optimal below 30 MHz (~10 times less sensitive at 10 MHz than at 30 MHz)
- Low frequency range antennas should be considered
  - LSS
  - LOFAR?
  - IRA, Kharkiv
  - Other options?
- New antenna pre-amplifiers necessary
  - LSS/Nancay/Meudon
  - LOFAR?
  - IRA, Kharkiv: 10--70 MHz
  - Other options?

LOFAR-CM operation

- Regular LOFAR operation
- When only the LOFAR core is used:
  - All the outer stations could be used together
  - LOFAR-CM could be used with the inner Ukrainian radio telescope network (8-32 MHz) and/or Nancay
  - Stand-alone observations
  - Together with spacecraft: STEREO, Ulysses, WIND, Cassini etc.
- Distances between the sites
  - Exloo – Rakhiv: 1400 km
  - Exloo – Kharkiv: 2100 km
  - Rakhiv – Kharkiv: 900 km
- Careful calibration needed

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Scientific motivation

- Solar radio emissions
- Passive detection of CMEs
- Solar wind parameters and interplanetary plasma by means of interplanetary scintillation
- In combination with a radar: detect radar signals bounced off CMEs and coronal density structures
- Jovian radio emissions enables studies of: magnetic field, magnetosphere, plasma environment (specially the Io torus), Io-Jupiter interaction, decametric emissions, rotation period, etc
- Planetary electrostatic discharges: SED, UED
- Detection of exoplanets
- Origin, evolution and end-stages of radio sources

Upcoming activities

- Preparation of full-scale proposal for LOFAR-CM by early summer 2008 (FFG, ASAP-6)
- Proposers
  - Space Research Institute, Graz, Austria
  - Institute for Radio Astronomy, Kharkiv, Ukraine
  - LESIA, CNRS, Meudon, France
  - TIMPANI, Rakhiv, Ukraine
- In case of successful proposal, project (and financing) could start in early 2009