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Remote Sensing
Direct and Inverse Scattering

Both theoretical and experimental approaches are welcomed.The journal aims also to promote the cooperation between scientists working on application of electromagnetism internationally and in particular in the Trans Black Sea Region.

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TRANS BLACK SEA REGION UNION OF APPLIED ELECTROMAGNETISM (BSUAE)

SPECIAL ISSUE

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Coherent Population Trapping Effect and its Applications for Weak Magnetic and Electromagnetic Field Detection
Ch. Andreeva, Y. Dancheva, G. Alzetta, A.Rossi, S. Cartaleva 1

An experimental demonstration of the possibility to use Coherent Population Trapping phenomenon occurring at Zeeman sublevels of hyperfine levels of Rb for measurement of weak magnetic and electromagnetic field is reported. For degeneracy of the ground level F_g higher that degeneracy of the excited level F_e, subnatural width dark resonances are observed irradiating Rb vapour by linearly polarized laser light. The width of the dark resonance changes significantly in the presence of several tens mG magnetic field. Under consideration is model giving quantitative dependence of resonance linewith on the value of the magnetic field. In case of $F_g \geq F_e$ and circularly polarized laser light, subnatural width bright resonances are observed in the fluorescence signal. Application of few tens mG magnetic field causes several times increase of the contrast of the bright resonances which can be used for precise magnetic field measurements. Better spatial resolution for measurement of weak magnetic field can be achieved, using methods based on CPT effect occurring at Zeeman sublevels. Simple and compact all-optical device can be built.

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Stanislav Simeonov 59

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The influence of the unhomogeneities in the own point defects distribution on the Ag_2Te crystals magnetic resistance field and temperature dependencies is investigated. It is found that in strong magnetic field at 300 K the field crosswise and longitudinal dependence is close to linear. On the basis of the observed specific features in crosswise and longitudinal resistance it may be concluded that the bigger part of the own point defects in Ag_2Te are located in fluctuational accumulations, unhomogeneously distributed in the crystal volume.

Determination Of The Stratospheric NO_2 Slant Column By Means Of Gascod Type Instrument At Stara Zagora Station
R.Werner, At. Atanassov , D.Valev, G.Giovanelli,D.Bortoli, F.Ravegnani, A.Petritoli, Iv.Kostadinov 79

NO_2 is a member of the nitrogen oxides family, which takes part in a large number of homogeneous chemical and photochemical reactions. They are very important for the distribution of the stratospheric ozone and the ozone decline and hence contribute to the global climate changes. So, it is clear that (understanding of the temporal and space NO_2 variations could contribute to improvement of the knowledge in this field) plays a significant role in understanding the climate change processes.

The study of the photochemistry and transport phenomena of NO_2 requires long-time measurements.

Since 1993 a ground-base UV-VIS spectrometer, named GASCOD and developed at the Institute for Atmospheric and Oceanic Sciences (ISAO), is operating at Mt.Cimone station (42°N, 11°E, 2165m a.s.l.) near Bologna, Italy, and is employed for detection of atmospheric trace gases – ozone, NO_2 etc.

Since August 1999 a similar instrument has been installed at the observatory in Stara Zagora (44°N, 25°E, 269m a.s.l.), Bulgaria, at the Department of the Solar-Terrestrial Influences Laboratory for diurnal and long-time studies, simultaneous at Mt.Cimone and Stara Zagora.

The Stara Zagora GASCOD type instrument is placed on the roof of one of the observatory buildings and the diffused zenith skylight is directed to the spectrometer by means of a 45° mirror and via a f/5 telescope it is focused on the entrance slit. The incoming radiation is spectrally split by a holographic grating of 1200 groves/mm.

The spectra are registered by a multichannel detector of 512 diode array of a Hamamatsu type. The spectral dispersion is 2.4 nm/mm and the resolution is about 0.5 nm. The integration time is automatically selected for each measurement and ranges from few seconds at noon to several minutes at twilight. The instrument records the spectra in the range of 410 nm to 460 nm. DOAS methodology is applied for retrieving the NO_2 slant column. The spectral analysis uses minimum least squares fitting of the cross sections at the expected absorbers to logarithm of the twilight spectrum and a reference spectrum. The twilight spectra are measured daily in the morning and in the evening. The reference spectra are registered at noon. The preliminary results are shown and a comparison is made between the measurements carried out at Mt.Cimone station and Stara Zagora station.

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Pavlik Rahnev Rahnev **87**

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