



On the Sources Above the Neutral Line of Radial Magnetic Fields

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In this work we continue the investigation of the radio sources above the neutral line of radial magnetic field (NLS), since their nature remains still unclear. So, for example, the problem of non-thermal nature of “halo” sources (NLSs with relatively big angular size) requires additional discussion.

We investigated NLSs with wide range of their sizes and with quite different spectral characteristic of emission. It was noted that the flux of NLS increases with the increasing of quasi-longitudinal magnetic field gradient on the photosphere.

NLS in AR NOAA 10486 lies in the base of the current sheet. It is quite possible that this fact is the reason of the narrow-band spectral peculiarity: the antenna temperature (in polarization) is positive at the wavelength 5.26 cm, while it is negative on the neighbor wavelengths. The sharp temperature change from positive to negative values (temperature inversion) occurs while the wavelength changes from 5.26 cm to 6.52 cm. Such spectral behavior causes by relative decreasing of the extraordinary emission, and can be observed when hot areas (with a characteristic size about 1 Mm) occurs on the line-of-sight.

Such spectral detail can be related to the “bridge” between two regions of photosphere magnetic fields through the region of the field with opposite polarity.

It is most probably that NLSs are placed in the top of the coronal loop. Observed weak polarization of NLSs (including halo-NLS) describes well in the terms of cyclotron emission mechanism. Theoretical analysis of the sources spectra in the top of the coronal loop (i.e. in the quasi-transversal propagation conditions) shows that the modeled emission angle distribution is like the halo-NLS one (e.g. the polarization degree decreases in the range of 60 to 85 degrees).