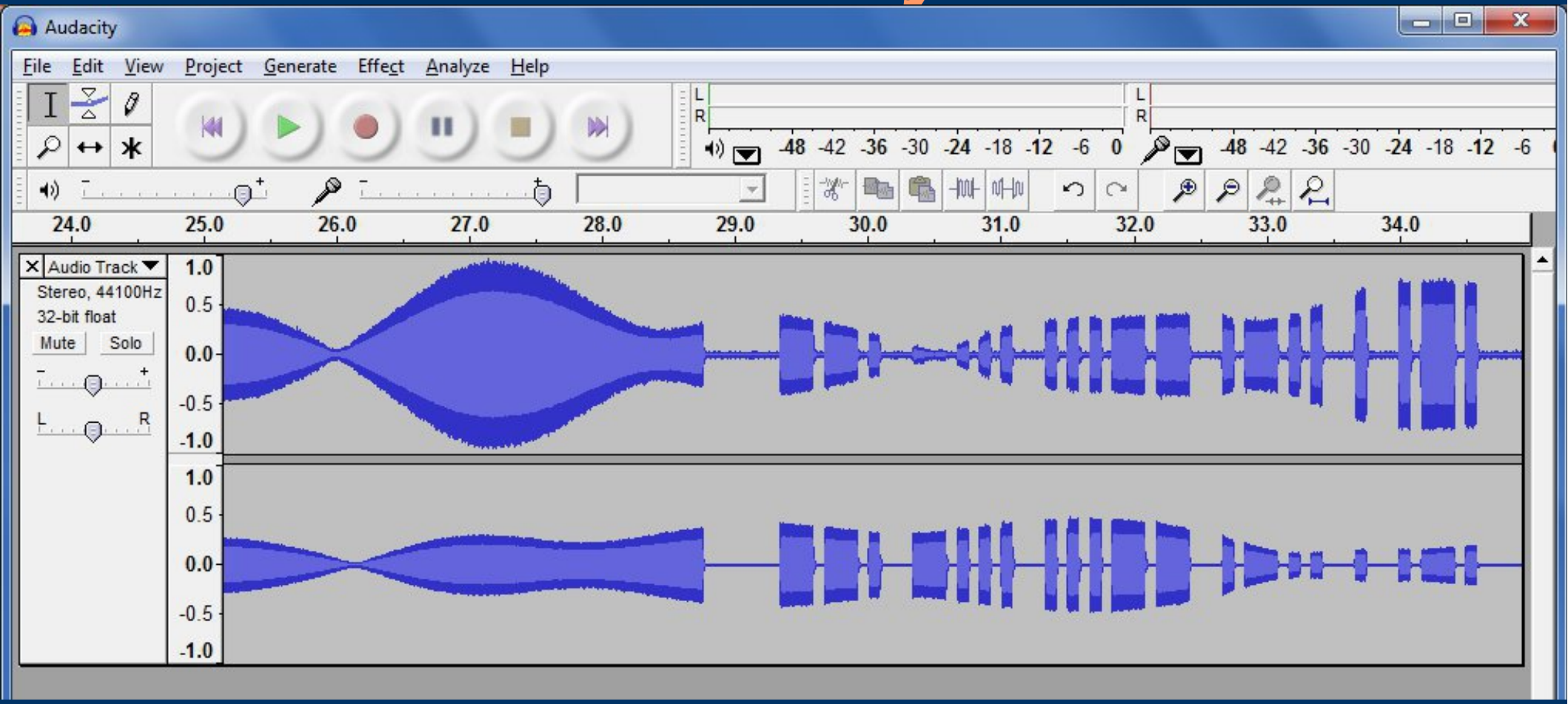
6m reception with polarisation diversity



Graham G3TCT

Diversity

- A scheme for improving reliability of reception
- 2 or more channels which may be separated in
  - Frequency
  - Space
  - Time
  - Polarisation

Diversity

- G2HCG Practical Wireless November 1989 re 28MHz ionospheric paths:-

  the polarisation of the transmitted signal is irrelevant; the received polarisation is controlled by the ionosphere; and most fading is caused by polarisation changes

Diversity

- Useful for iono - signals - including EME!
- Independent receivers with separate antennas
- Processing – election / combining systems

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- Independent receivers with separate antennas
- Processing – election / combining systems
- S/N evaluation? Fading rate?
- Stereo – use your brain!

Polarisation diversity

- Uses cross polarised antennas
- Two receivers locked in frequency, b/w, gain etc
- Stereo headphones

Polarisation diversity

- Uses cross polarised antennas
- Two receivers locked in frequency, b/w, gain etc
- Stereo headphones
- For EME - MAP65 s/w from K1JT
- Dual polarisation system, matches pol'n angle of each signal

5ele: 9.2dBd; vertical: 2.8dBd

Equipment

- K3 with sub rx – common reference frequency, matched filtering
- Separate sub rx antenna input
- Zoom H2 stereo recorder
- Audacity software for editing
- Soundcard oscilloscope for display

Why we get V pol from H pol?

- Wave starts as H pol

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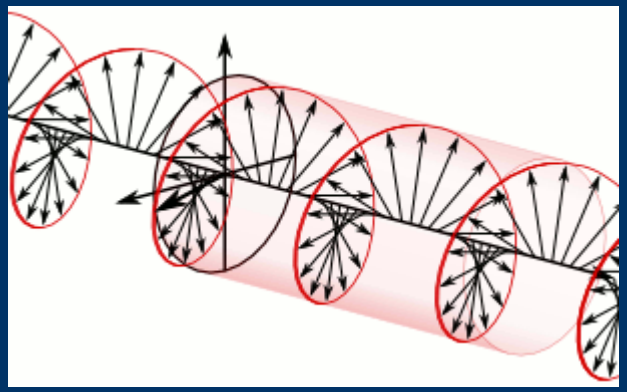
- linear pol equivalent to vector sum of RH and LH circular pol

Circular polarisation

- Left hand circular



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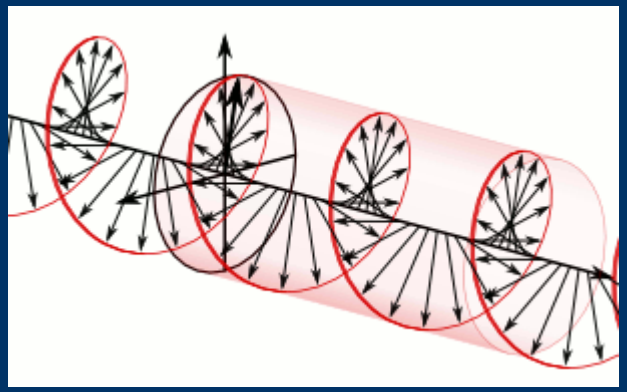


Acknowledgements to Wikipedia

Why we get V pol from H pol?

- Wave starts as H pol
- linear pol equivalent to vector sum of RH and LH circular pol
- Ionosphere + mag field → RH circ + LH circular components - ordinary and extraordinary waves
- These two waves propagate along different paths (wavelengths and phase speeds differ)

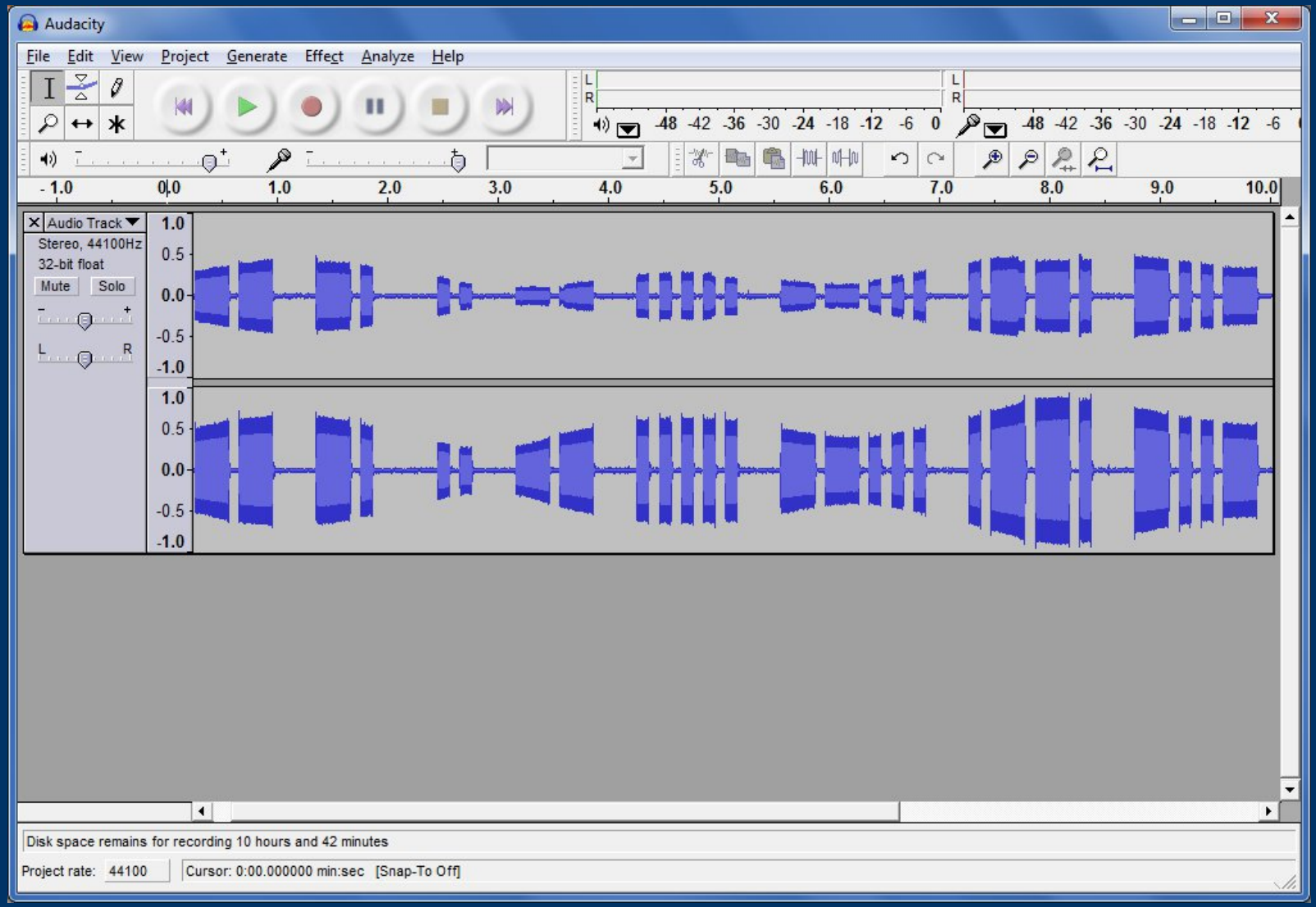
Why we get V pol from H pol?

- Wave starts as H pol
- linear pol equivalent to vector sum of RH and LH circular pol
- Ionosphere + mag field → split into RH circ + LH circular - “ordinary and extraordinary waves”
- These two waves propagate along different paths (wavelengths and phase speeds differ)
- At the rx, the resultant wave will appear to be of mixed polarisation with H pol and V pol components.

Example – CS5BLA by Es, 1534km

H pol

V pol



Polarisation diversity

- Can display the two signals on a X-Y oscilloscope to show relative amplitude and phase
- Horizontal yagi – x axis and LH channel
- Vertical antenna – y axis and RH channel
- Lissajous figures – a reminder

GB3LER beacon

- Single hop Es propagation, 1008km
- 5 Aug 2010

GB3LER beacon

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GB3LER beacon

- Auroral Es propagation, 1008km
- 26 Sept 2011

GB3LER beacon

- Auroral Es propagation, 1008km
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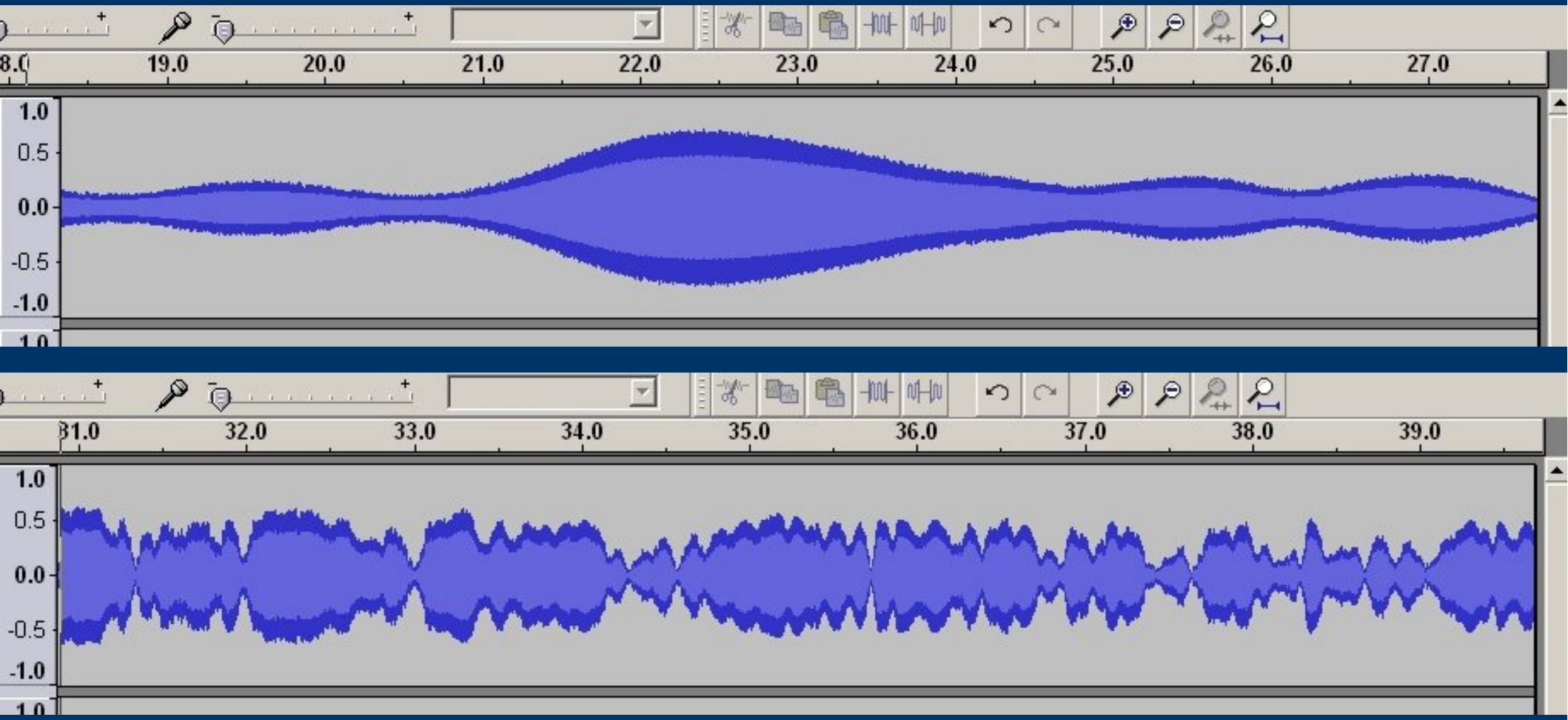
GB3LER on 6m by Es and Au E



6V7SIX beacon

- F2 propagation, 4274km
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GW7SMV working K1TOL

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- K1TOL – multi hop Es 4935km
- Channels swapped, vertical on LHS
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3B9FR

- F2 + Es? 10144Km
- 14 May 2015
- Very weak on vertical, almost constant H pol

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ZS4TX/6

- TEP +Es, 8745km
- 2 May 2015

ZS4TX/6

- TEP +Es, 8745km
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E4X

- Multi hop Es, 3758km, 5 Jun 2010
- Strong on vertical pol
- What does “up” mean?!

E4X

- Multi hop Es, 3758km, 5 Jun 2010
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That's all folks!

For more info, see

www.g3tct.co.uk/diversity.html