To: EDGES Group
From: Alan E.E. Rogers
Subject: Mechanism for interconnection resonances

Figure 1 shows a schematic and equivalent circuit which can lead to a resonance in the case of a loose or partially loose connector. The resonance forms as a result of a loop in the ground path. For a loop with radius 10 cm the inductance, L, is about 0.25 µH so a poor connection with resistance, R, of $10^{-3}$ ohms and capacitance, C, of 40 pF will result in a resonance at 50 MHz with depth of $10^{-4}$ dB or about 20 mK out of $10^4$ K.

Unfortunately, the SMA connector design does not guarantee good contact between shields as discussed in memo #270. In general, however the contact via the threads of the connector should be adequate if connectors are tightened with sufficient torque. Placing a ferrite toroid over the coax ensure a large reactance in series with the inductance L which helps ensure that any sharp resonance will be removed.

![Figure 1. Resonance which results from poor contact between coax line shields.](image)