The identification of the energy source (central engine) explaining the energy loss associated with the jets from active galactic nuclei (AGNs) is a long-standing problem of astrophysics. In the model of Blandford and Znajek (BZ model) for the central engine as a blackhole, the Penrose process would provide the energy. The energy would come basically from the blackhole mass.

Empirical support for the BZ model emerges from the study of the supermassive blackhole associated with a galaxy known as Messier 87 (M87). The finding is that the magnetic field associated with the jet structure is tightly wound helical structure and so strong that it would control the dynamics of the matter from falling to blackhole except by occasional leakages. Electron-positron pairs created in the annihilation of photons would accelerate in the force-free helical electromagnetic field having also an electric component.

The TGD based model involves several aspects of the new physics predicted by TDG. TGD leads to a model of galaxies and other astrophysical structures. Inflaton decay is replaced with the thickening of cosmic strings to flux tubes liberating as ordinary matter. Hierarchy of Planck constants $h_{eff}=nh_0$, in particular Nottale's hypothesis predicts quantum coherence in the exterior of in scales at least of order Schwartschild radius of the blackhole-like entity. Zero energy ontology (ZEO) predicts that the arrow of time changes in ordinary state function reductions. TGD replaces black-holes with blackhole-like entities (BHs) and white-holes with their time reversals (WHs) allowed in ZEO.

BH (WH) would be a volume filling flux tube but with a relatively small value of h_{eff}. In the case of WH, it would provide "metabolic energy" for jets and take care that the value of h_{eff} is preserved (the analogy with living systems is very strong). The jets would be analogous to laser beams/supracurrents with a huge value of $h_{eff}=h_{gr}$. The model would also explain the ultrahigh energy cosmic rays. The force-free fields would be generalized Beltrami fields associated with flux tubes and identifiable as minimal surfaces in the Minkowskian regions of space-time surface. The absence of classical dissipation would be a correlate for the absence of dissipation for supra-currents and dark photon laser beams.