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RELATIVISTIC MOTION IN QUASARS

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SUMMARY. This is a summary of an article which will appear in "Highlights of Modern Astrophysics" (Cohen, 1985).

The majority of strong core-dominated radio sources show superluminal motion and rapid variations in flux density. Some of them also have X-rays which are weaker than the amount predicted by the inverse-Compton effect. All these characteristics can be explained by relativistic motion. The superluminal motion and the unusual rapidity of the variations are kinematic effects. The radiating source nearly keeps up with its own radiation, with a consequent reduction in time scales. The weak X-rays are an artifact introduced when the inverse-Compton calculation is based on the spectrum measured in the terrestrial coordinate system. When allowance is made for motion towards the observer, the measurements give a lower limit to the Doppler factor of the moving source.

The common model uses a narrow jet pointed at angle θ to the line of sight, and carrying luminous blobs moving at Lorentz factor γ. This model can explain all the above effects, and also the common core-jet radio morphology. Application of the model gives values of γ between 5 and 10, and values of θ less than 20^{o}.

The Doppler effect boosts the flux density of those jets which are pointed nearly at us. The strong sources we see must therefore form a small subset of a large population of sources most of which are misdirected and weak. It is likely that the parent population consists of the "classical double" quasars. Nearly all of the superluminal sources have low surface brightness halos, which could be the outer double radio lobes seen end-on.

REFERENCES

Cohen, M.H. 1985, "Evidence for Relativistic Motion in Quasars", in Proceedings of the Salpeter Symposium "Highlights of Modern Astrophysics", eds. S. Shapiro and S. Teukolsky (New York: John Wiley and Sons), in press.

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