Cosmic gridlock

Poet William Blake saw the world in a grain of sand. But now we must ask, how about in traffic gridlock?

Poets might find the image unappealing, but those with whom poets share a kinship -- physicists -- see beauty there, on MoPac at 6 p.m. or Interstate 35 at rush hour. What us regular Joes would regard as "Ah, man! A traffic pileup!", the physicist sees as a fascinating structure, worthy of a deep feeling of awe -- simply "Ah!" To them, cars are molecules on the move. It came then as comforting news that nuclear physicists who once pondered the fundamental nature of matter and weapons strategies for the Cold War are now studying a baffling, daunting mystery: Why is traffic so bad? The Washington Post reported how in New Mexico the Los Alamos National Laboratory, birthplace of the atom bomb, is employing physics theories in the study of traffic.

"Traffic is particles with motive. I think it's cool as hell," said Chris Barrett, the scientist who convinced Los Alamos that traffic was a matter of grave national security. And here at the University of Texas, professor Hani S. Mahmassani put it this way to the Post: "'All of a sudden to go from free flow to stop-and-go, this remains one of the mysteries of our time." Here's the physics part. Some scholars liken the traffic stream to a fluid, the braking and acceleration like waves that ripple through the flow. Sudden changes, such as slowdowns, are comparable to what happens when steam turns to water or water to ice. In light traffic, you drive how you like. When roads grow crowded, you find yourself carried along in a traffic stream with everyone else and unable to change lanes. That's the liquid stage, called synchronized flow. When you're in stop-and-go traffic, your car is like a water particle crystallized into ice. (Never mind that you are heating up with road rage. That's beside the point.) Other scholars have their own images of traffic, such as the coordinated flight of a large flock of birds or the darting collective motion of a school of fish. Next time you find yourself in traffic, think of the cosmic questions. Am I like a fish? Am I like a bird? Am I a captive driver in the synchronized flow? Will I turn to ice or to steam, collectively, of course? While you wrestle with these questions, rest assured the work at Los Alamos and in physics laboratories around the world seeks to make your life easier. You might not know it yet, but word is there's a revolution under way that will put sensors in the roadways and sharpen computer simulation for traffic forecasting and planning beyond our wildest imaginings. As with traffic, just be patient.

Illustration: Ralph Barrera/AA-S

Traffic backs up on Ben White Boulevard eastbound waiting for the light change at Interstate 35.

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