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### **Purcell and the Development of Radioastronomy**

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“Join me for a ride on an electron, as we fly through electric and magnetic fields.” With those words, Ed Purcell began a course in Electromagnetic Theory. I had a front row seat. Ken Bainbridge recommended I take the course and get to know Ed. Ed’s wisdom and lucidity of thought soon gave the course, and Ed, a special place in my learning experience. I did not take notes in class. I was in awe at Ed’s ability to present the subject with such clarity and simplicity. Ed’s broad scope of interests and ability to present simple solutions to complex issues quickly led to my identification of Ed as the supreme mentor on any and all subjects. While working with Norman Ramsey to obtain an external beam from the Harvard Cyclotron, I consulted with Ed on the subject of available options. He suggested I scatter the beam off a target that could be remotely positioned, and catch it in a tunnel shielded from the magnetic field of the Cyclotron. When I had a problem with implementation I would, “ Ask Ed.” During a visit to the Lab by Fermi, he commented on the simplicity of the solution. He was not surprised to learn that Purcell provided critical guidance. When I suggested Meteorology as a subject for my Oral Test, Purcell said it was not a science and I should pick another subject. I argued it was a science. Ed asked that I loan him some books on the subject and the Oral would be in two weeks. When I walked into the room for the Oral, I noticed that Ed had invited all seven authors of the books I had loaned to him. A simple Purcell answer to a problem. When I asked about his recommendations concerning doctorate dissertation topics, he said the selection must be based on my interests not his. I provided a brief summary: Mathematics, Quantum Mechanics, Meteorology, and Astronomy. Within two weeks, Ed proposed I look into the Hydrogen Line. After a joint review of the papers by Van deHulst and Shklovski we concluded that: van de Hulst had clearly shown the line was undetectable, Shklovski had claimed the line was detectable, however, there was an error in his calculations. We noted, however, that the topic fit my interests. Purcell had a simple solution. I would proceed with a “negative thesis,” the goal to measure the level of non-detectability. As with all other joint ventures, Ed was always there when I needed help. His guidance was always simple and embarrassingly obvious. For my doctorate oral exam, Ed invited Van deHulst as the only other participant. Purcell began by asking if I had any questions. I asked Van deHulst why the line was detectable. Purcell then announced that I had my doctorate and could leave at any time, while he and Van deHulst worked on the answer to my question. Many of us became terribly alone on March 7, 1997, when we learned we could no longer “Ask Ed.”