

## The 2002 Outburst of the Recurrent Nova IM Normae

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### 1. Introduction

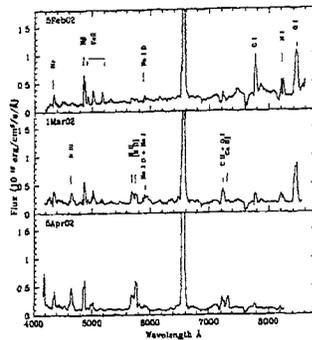
IM Nor was discovered as a possible nova in 1920, with a light curve that suggested similarity with slow novae such as DQ Her and T Pyx (Elliot & Liller 1972). A second outburst was discovered on 10 January 2002, when IM Nor was found to be at a red magnitude of 8.3 (Liller 2002). Subsequent observations confirmed the nova outburst, adding to the group of recurrent novae. The light curve of the recent outburst indicates it to be a moderately fast – slow nova with  $t_3 \gtrsim 50$  days (Kato et al 2002, Duerbeck et al 2002a). The spectral evolution of the outburst is presented here, based on spectra obtained from VBO using the 2.34m VBT during 2002 Feb–Apr and in 2003 Feb, and those available in the literature.

### 2. Spectral development

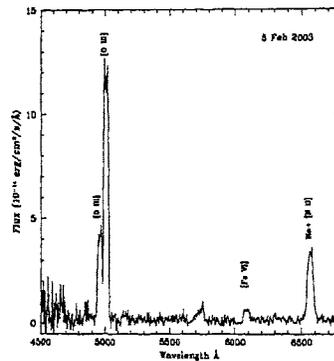
The early post-outburst spectra of IM Nor showed strong, Balmer lines, lines due to Fe II (27, 38, 42, 49, 74), O I and Ca II lines, all with P-Cygni profiles (Duerbeck et al 2002b, Retter et al 2002). The early spectra indicated the nova belonged to the ‘Fe II’ class. A change in the spectrum occurred around +45 days since maximum. The Fe II and O I line strengths decreased, and N III 4640, N II 5680 and other N II lines were present and strong in the blue region of the spectrum. He I 5876 was also weakly present. About +80 days since maximum, in early April, the spectrum resembled that of the ‘He/N’ class of novae. The spectrum had changed from Fe II to He/N type. Figure 1 shows the temporal evolution of the early spectrum. The spectrum obtained nearly 400 days after outburst maximum (Figure 2) shows an extremely weak continuum, with very few emission lines. The spectrum is that of a nova in its late decline nebular phase.

### 3. Summary

IM Nor is a moderately fast nova with a light curve development similar to those of moderately fast classical novae. The spectral development resembles those of the ‘hybrid’ novae (Williams 1992) which have “FeII” type spectra in the early phases that evolve to the “He/N” type. The light curve and the early spectral development of IM Nor resembles that of T Pyx. IM Nor thus belongs to the T Pyx class of recurrent novae. The accreting white dwarf in these systems has



**Figure 1.** Temporal development of the outburst spectra of IM Nor during 2002 February – April, based on spectra obtained from the Vainu Bappu Observatory. The change from ‘Fe II’ type to He/N type is evident in the March spectrum.



**Figure 2.** VBO spectrum of IM Nor ~ 400 days after the 2002 outburst.

a mass lower than those in the other RNe systems, and hence are not potential progenitors of supernovae of type Ia.

## References

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