

Informativity on G_0 (mutual information)

Lucas Einig

IRAM - GIPSA-lab

February 21, 2024

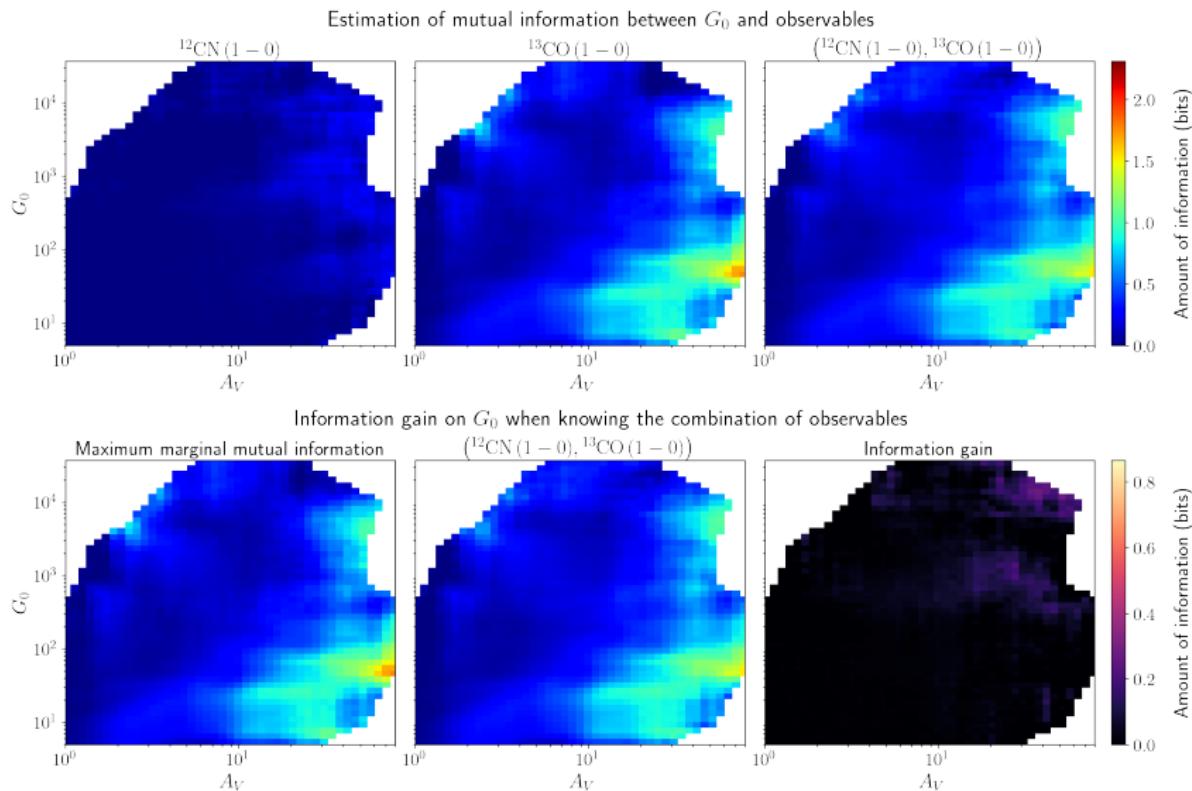
Outline

- 1 Combinations including ^{13}CO (1 – 0) (11 available)
- 2 Combinations including ^{12}CO (1 – 0) (11 available)
- 3 Combinations including C^{18}O (1 – 0) (8 available)
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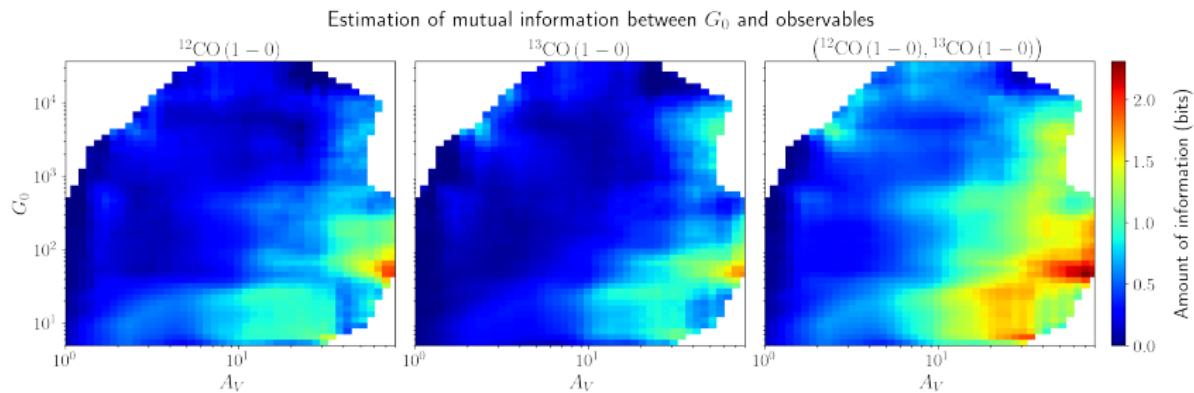
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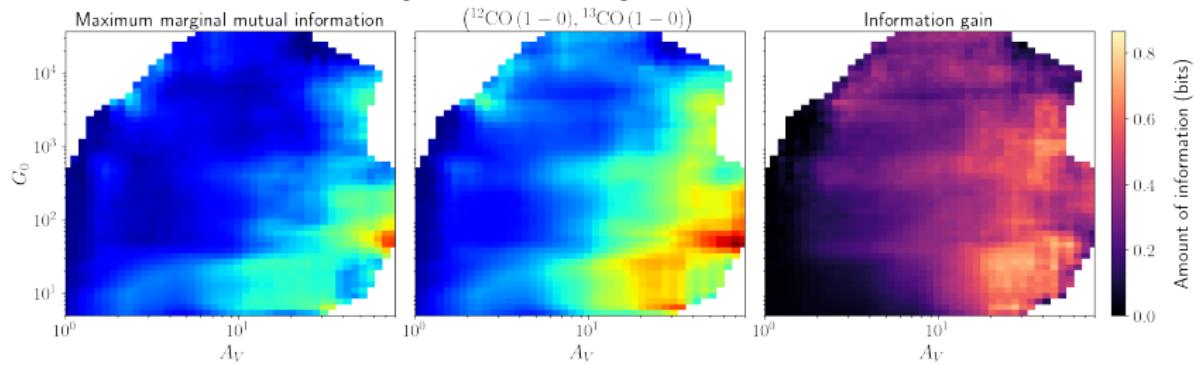
Informativity on G_0 of $(^{12}\text{CN}(1 - 0), ^{13}\text{CO}(1 - 0))$



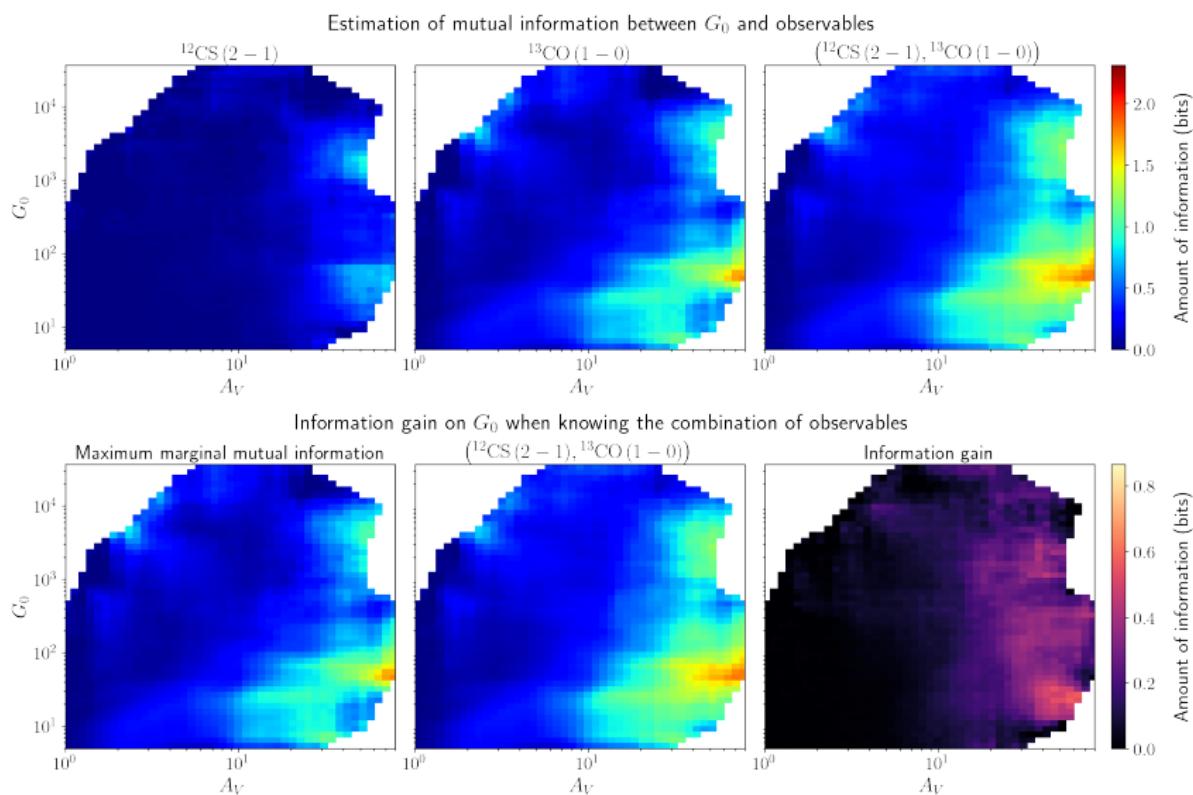
Informativity on G_0 of $(^{12}\text{CO} (1 - 0), ^{13}\text{CO} (1 - 0))$



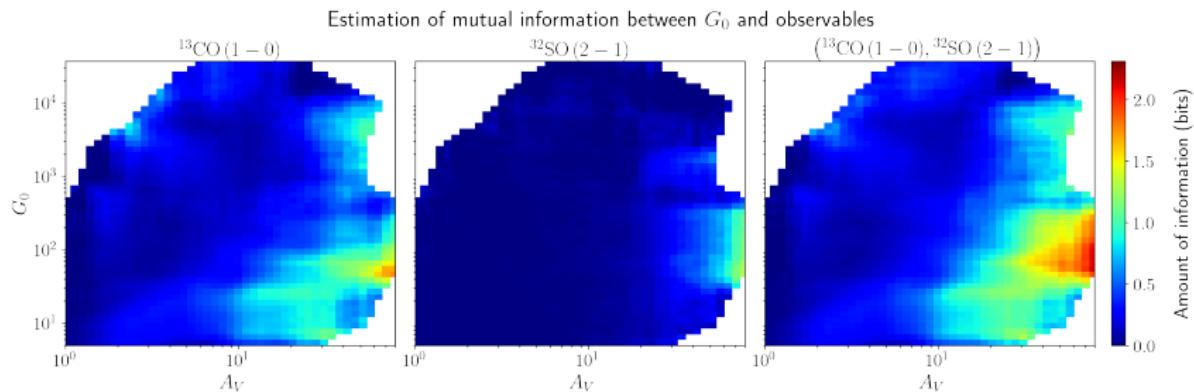
Information gain on G_0 when knowing the combination of observables



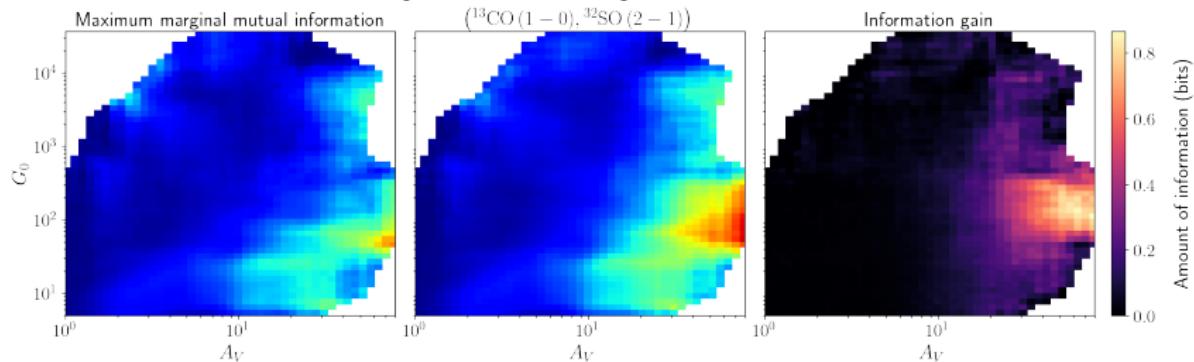
Informativity on G_0 of $(^{12}\text{CS}(2 - 1), ^{13}\text{CO}(1 - 0))$



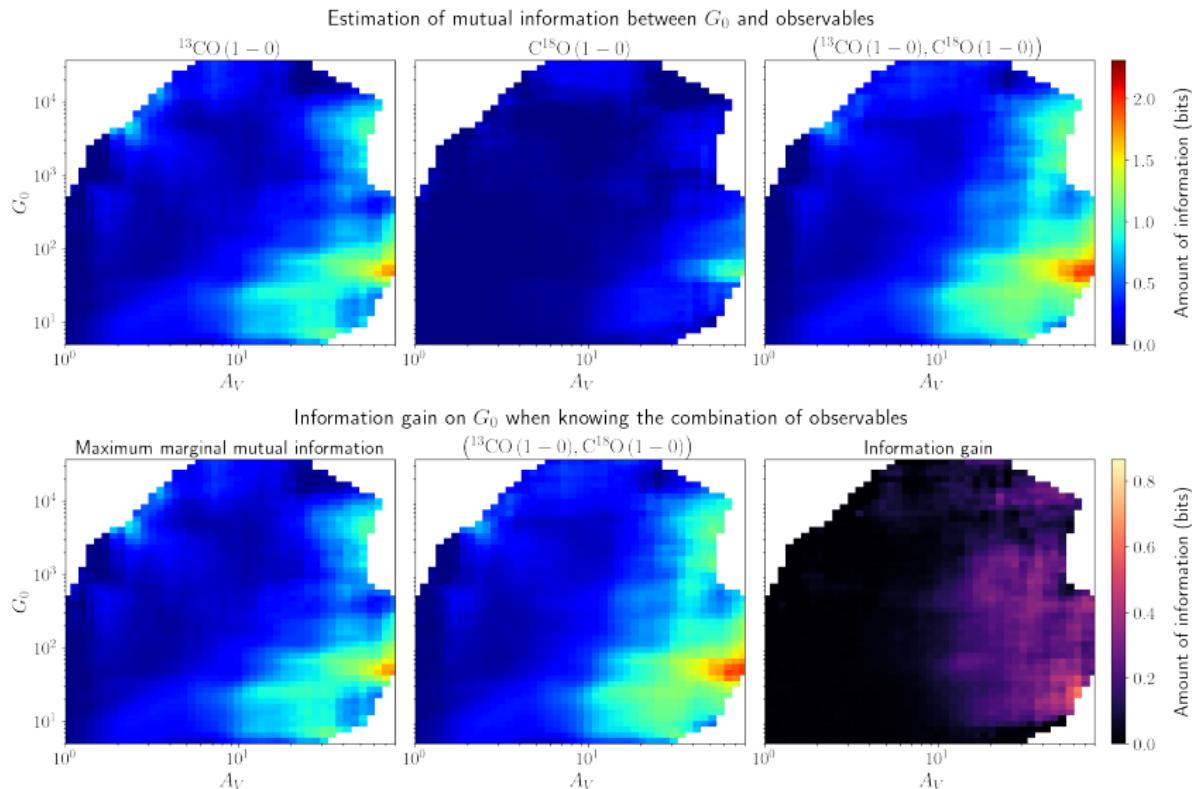
Informativity on G_0 of $(^{13}\text{CO} (1 - 0), ^{32}\text{SO} (2 - 1))$



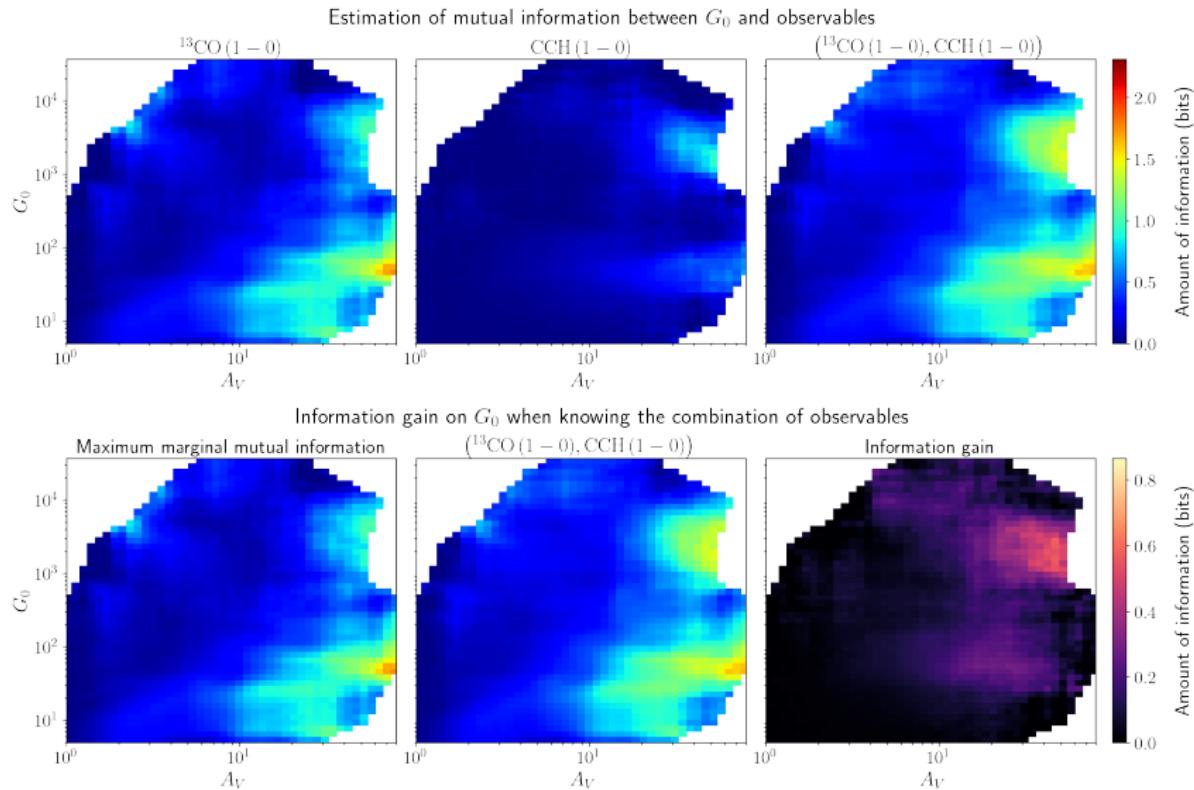
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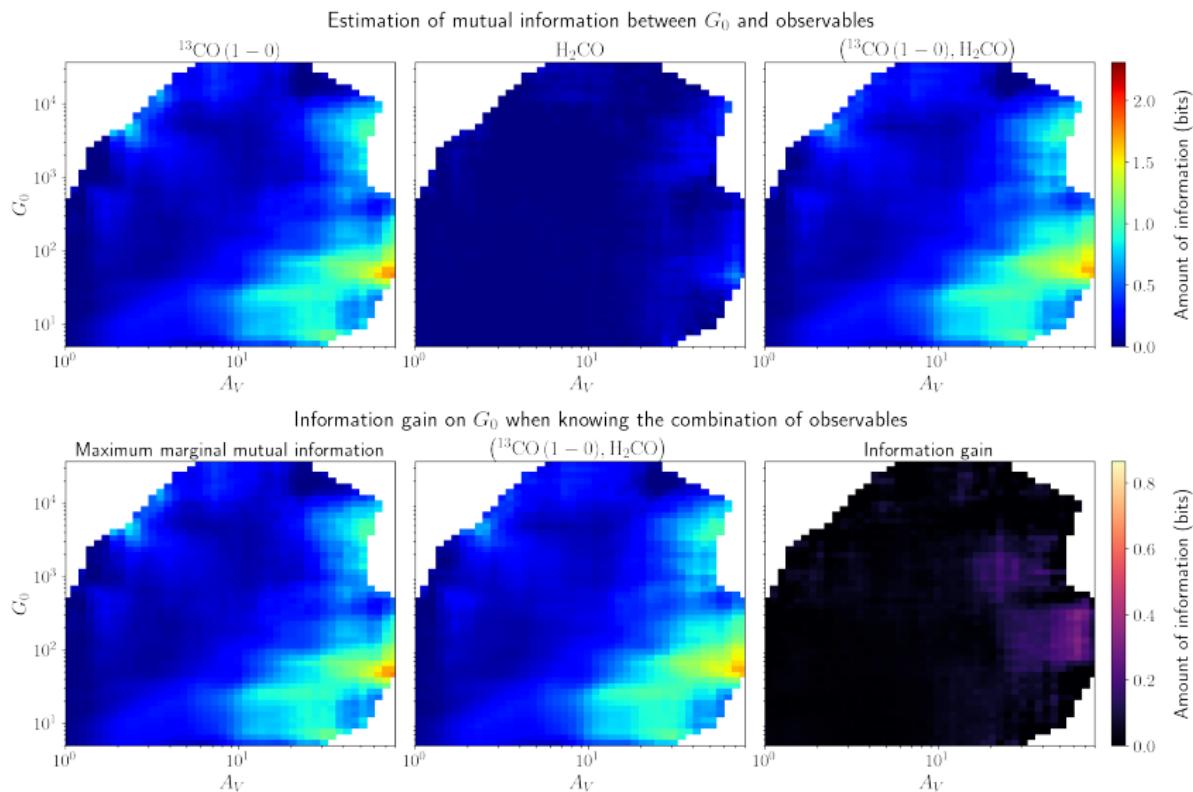
Informativity on G_0 of $(^{13}\text{CO} (1 - 0), \text{C}^{18}\text{O} (1 - 0))$



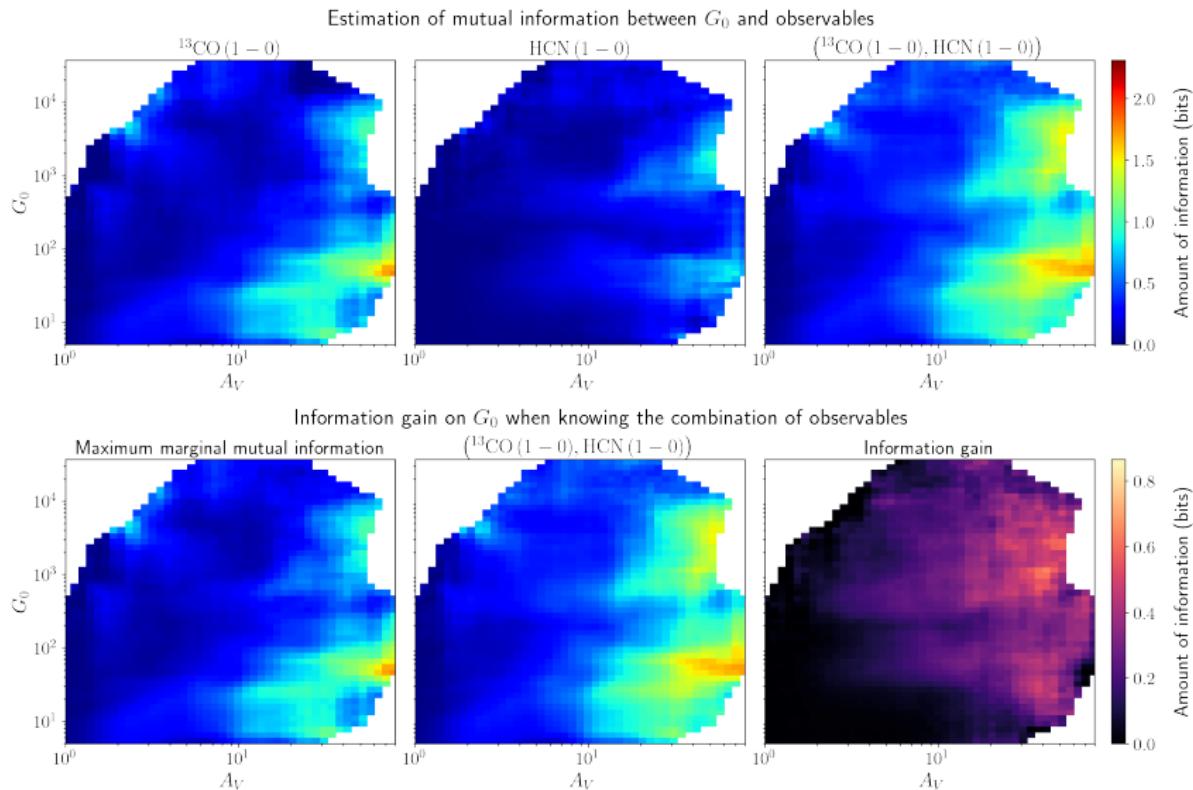
Informativity on G_0 of $(^{13}\text{CO}(1 - 0), \text{CCH}(1 - 0))$



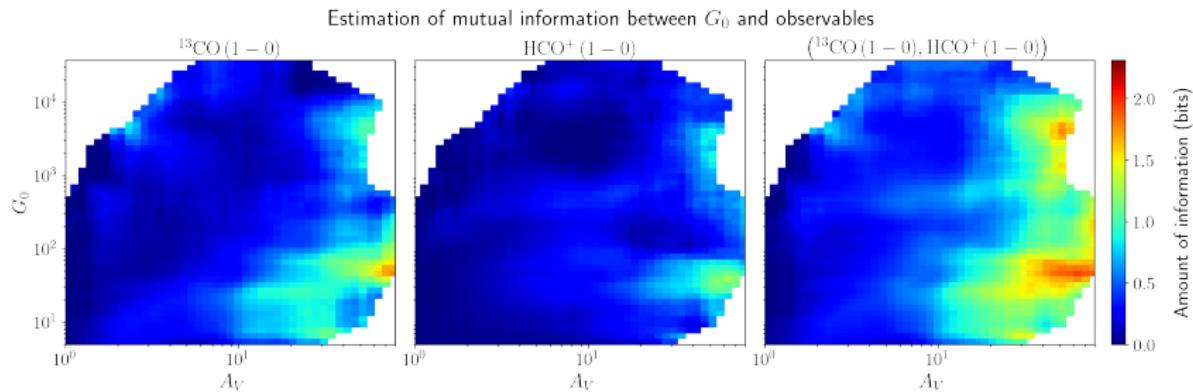
Informativity on G_0 of $(^{13}\text{CO} (1 - 0), \text{H}_2\text{CO})$



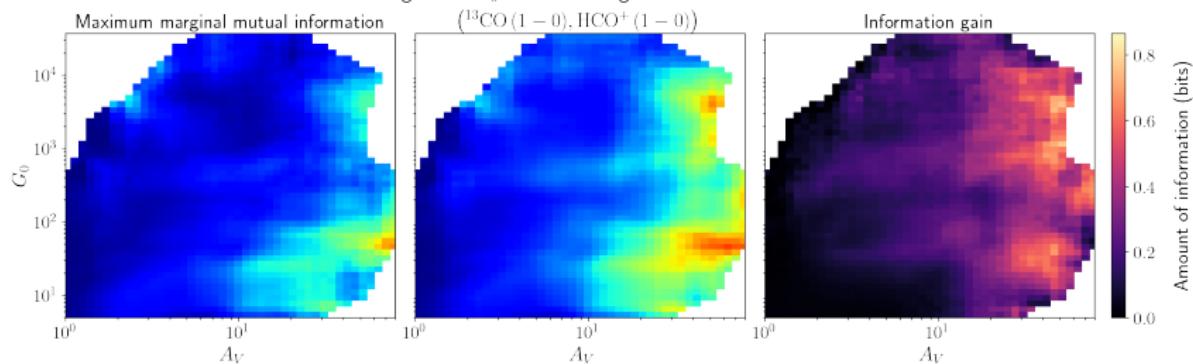
Informativity on G_0 of $(^{13}\text{CO} (1 - 0), \text{HCN} (1 - 0))$



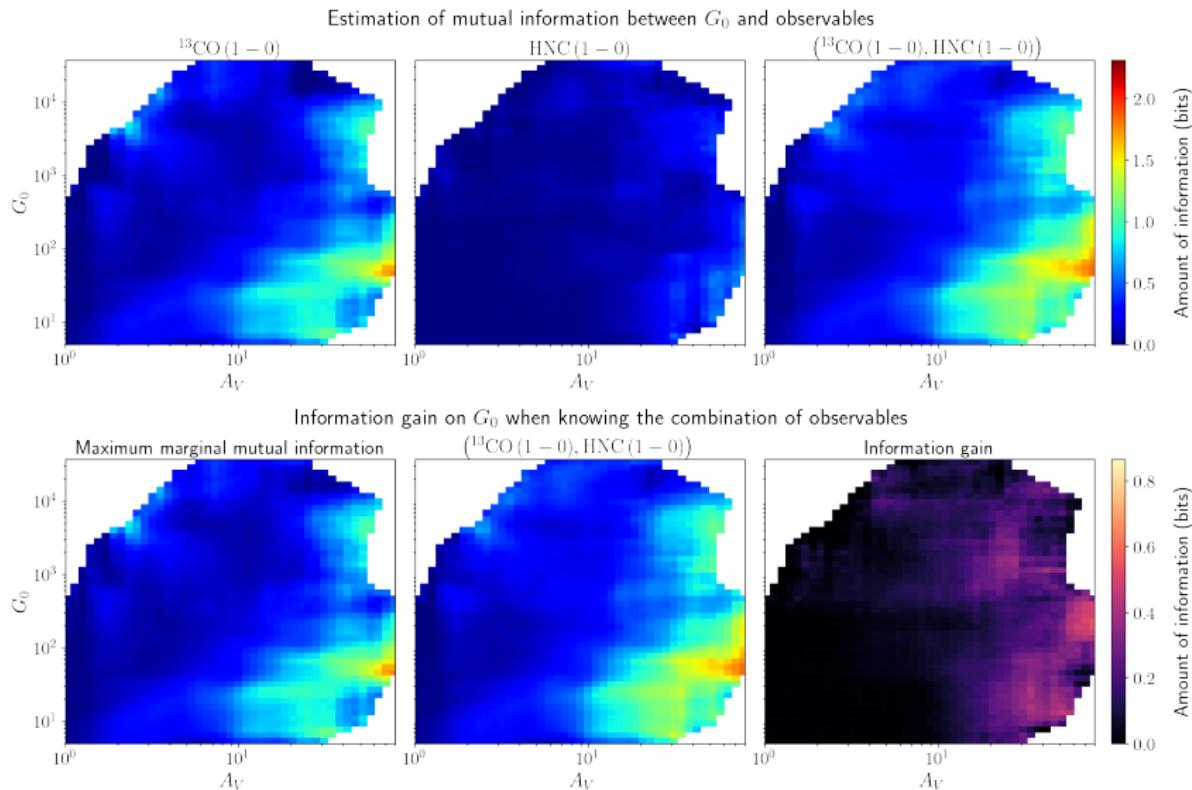
Informativity on G_0 of $(^{13}\text{CO} (1 - 0), \text{HCO}^+ (1 - 0))$



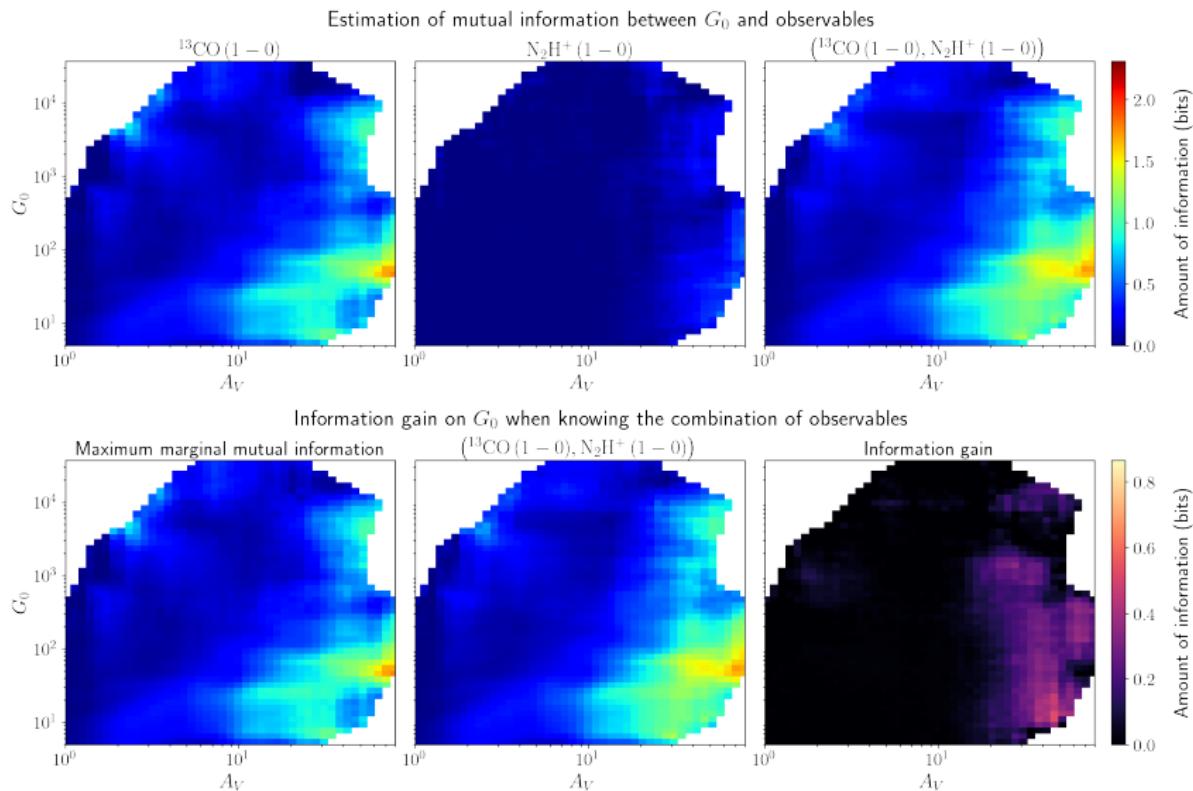
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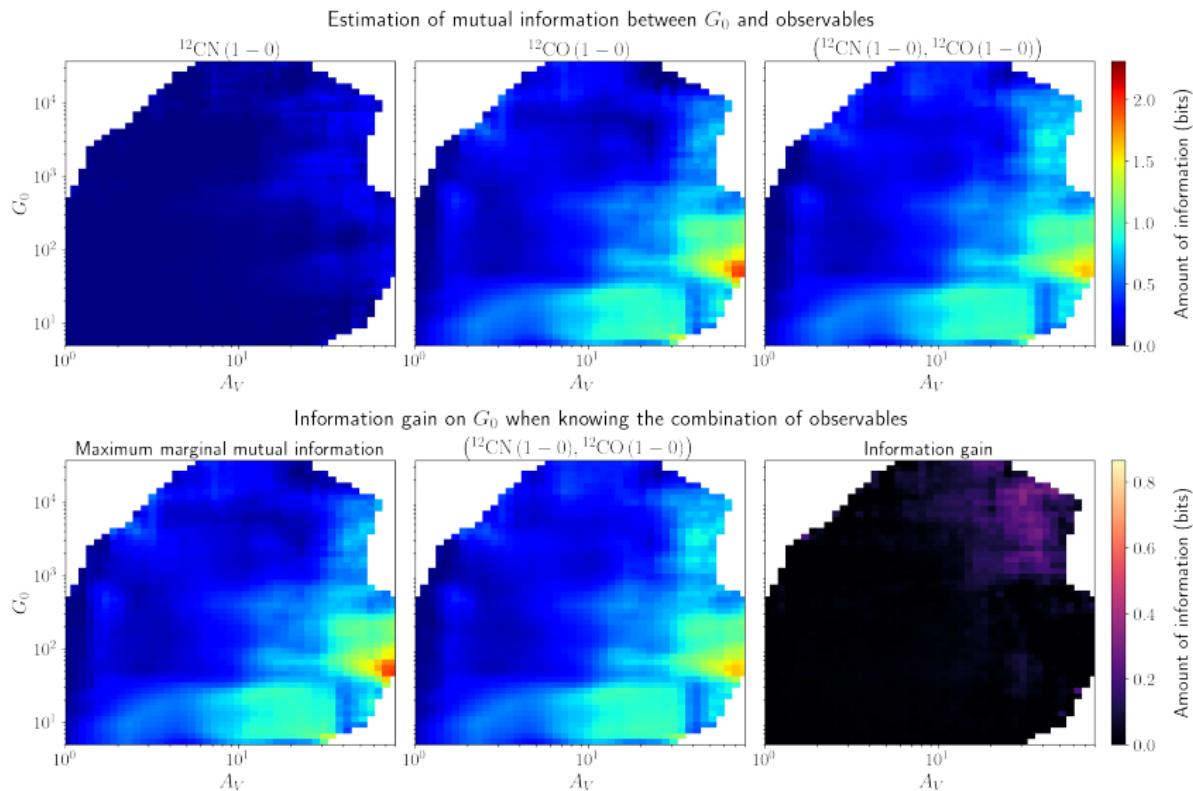
Informativity on G_0 of $(^{13}\text{CO} (1 - 0), \text{N}_2\text{H}^+ (1 - 0))$



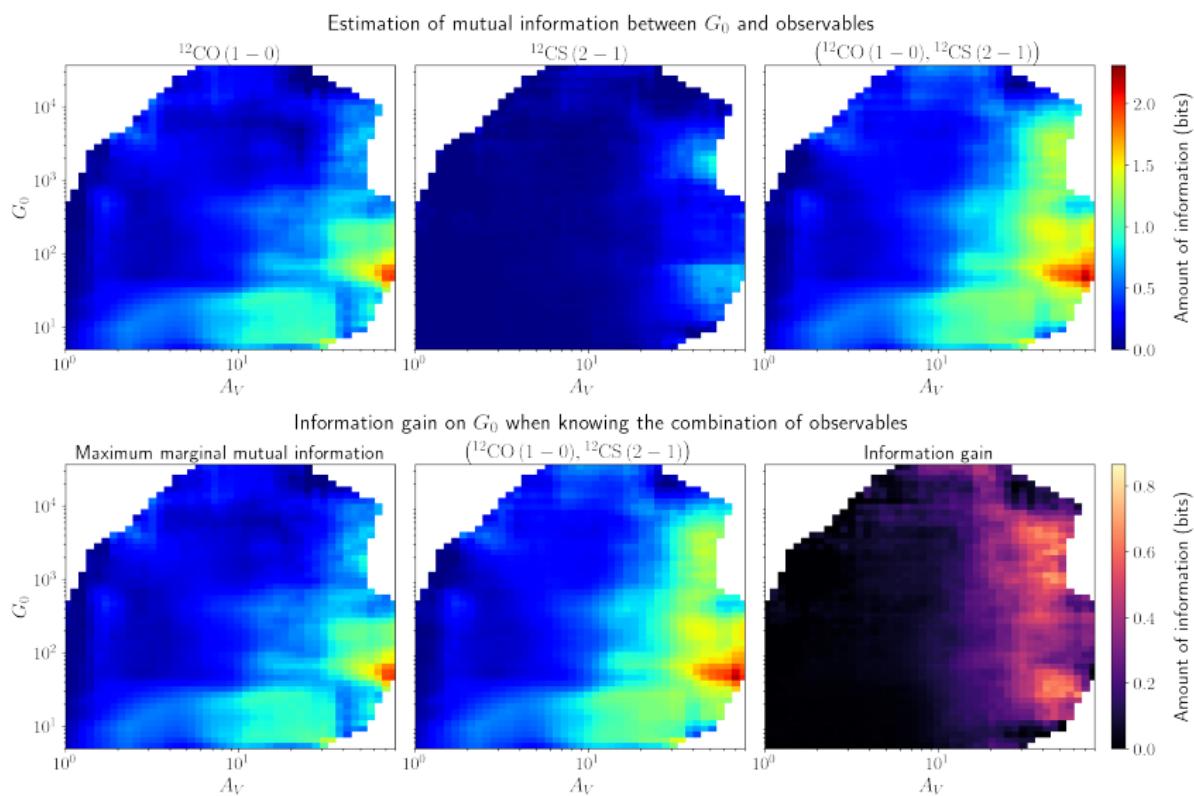
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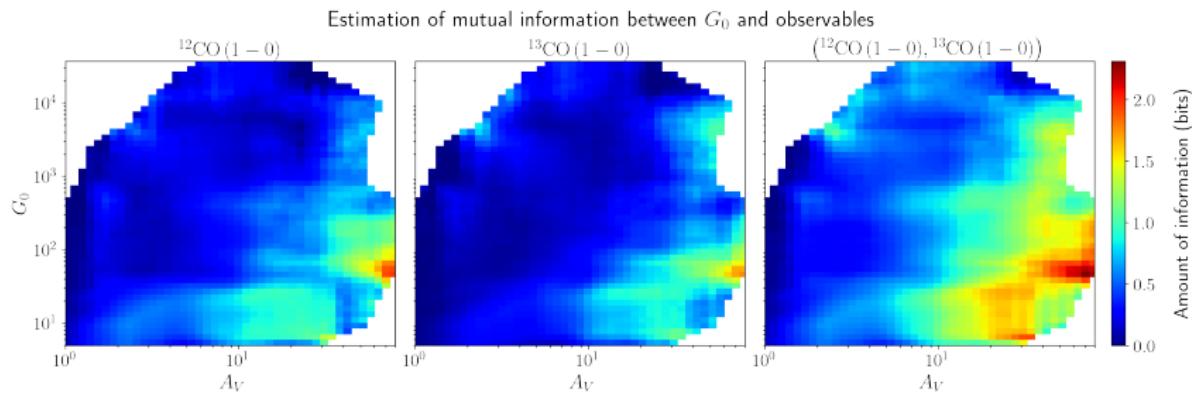
Informativity on G_0 of $(^{12}\text{CN}\,(1 - 0), ^{12}\text{CO}\,(1 - 0))$



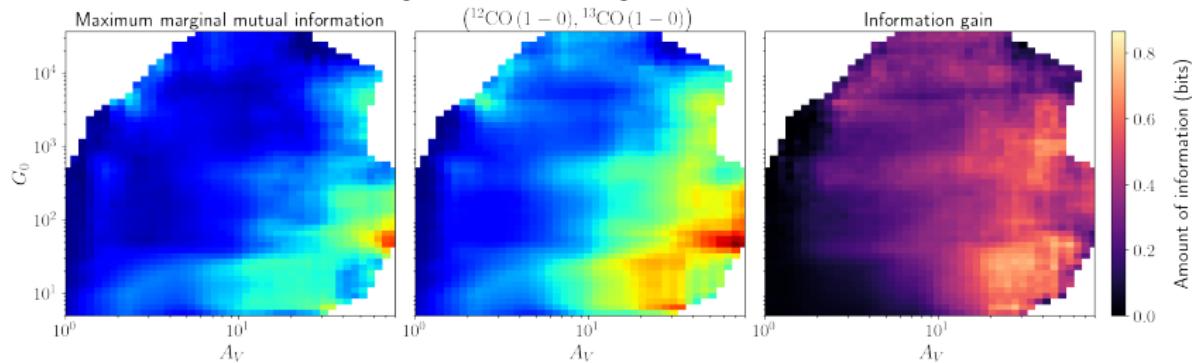
Informativity on G_0 of $(^{12}\text{CO} (1 - 0), ^{12}\text{CS} (2 - 1))$



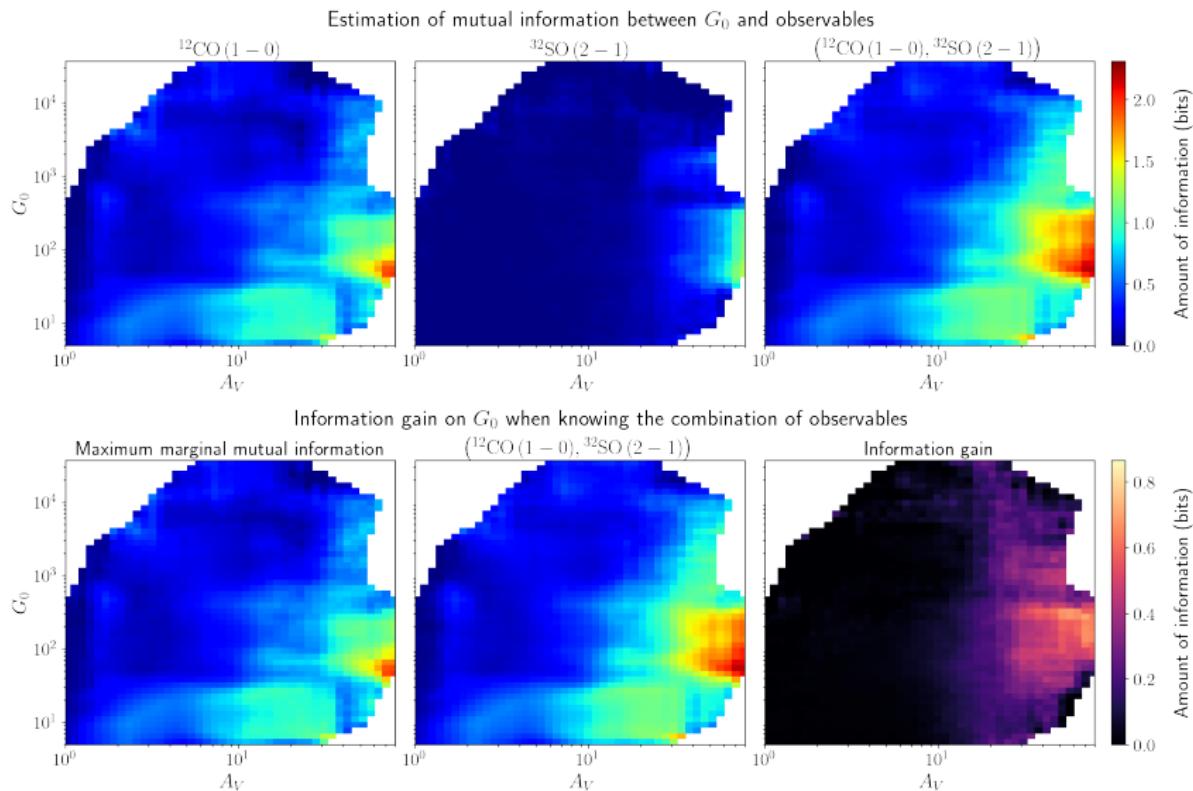
Informativity on G_0 of $(^{12}\text{CO} (1 - 0), ^{13}\text{CO} (1 - 0))$



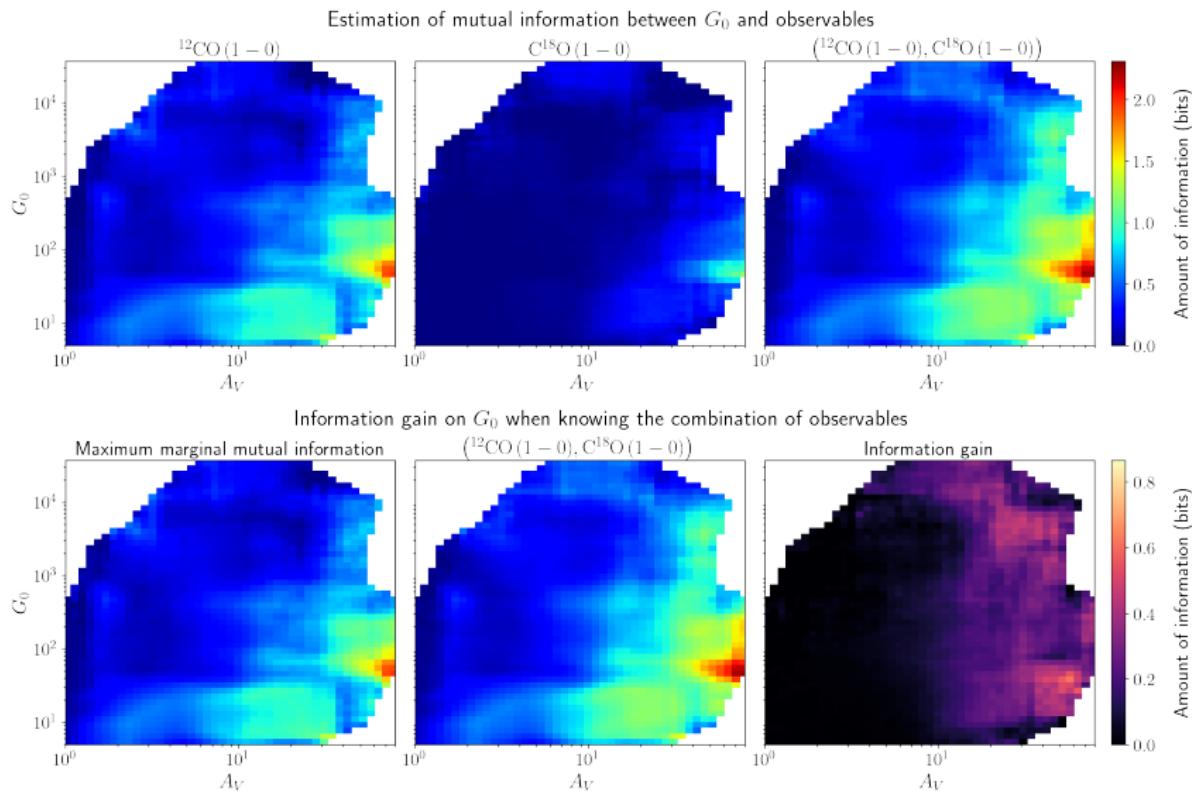
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Informativity on G_0 of $(^{12}\text{CO} (1 - 0), ^{32}\text{SO} (2 - 1))$

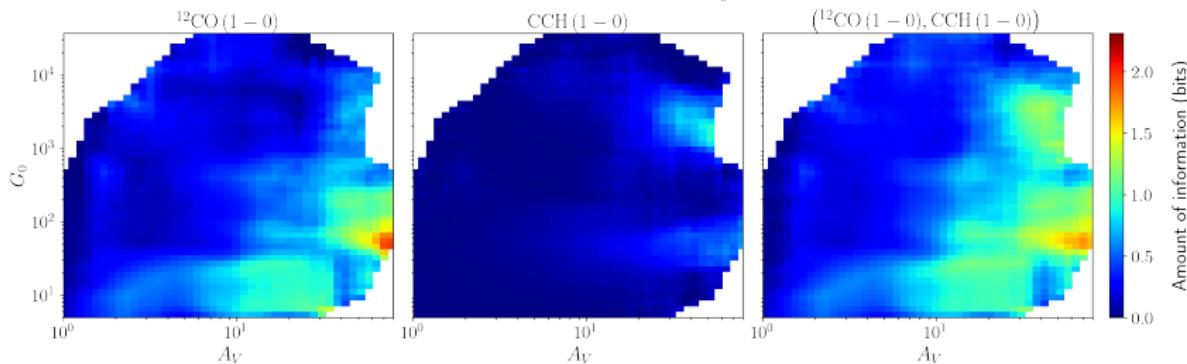


Informativity on G_0 of $(^{12}\text{CO} (1 - 0), \text{C}^{18}\text{O} (1 - 0))$

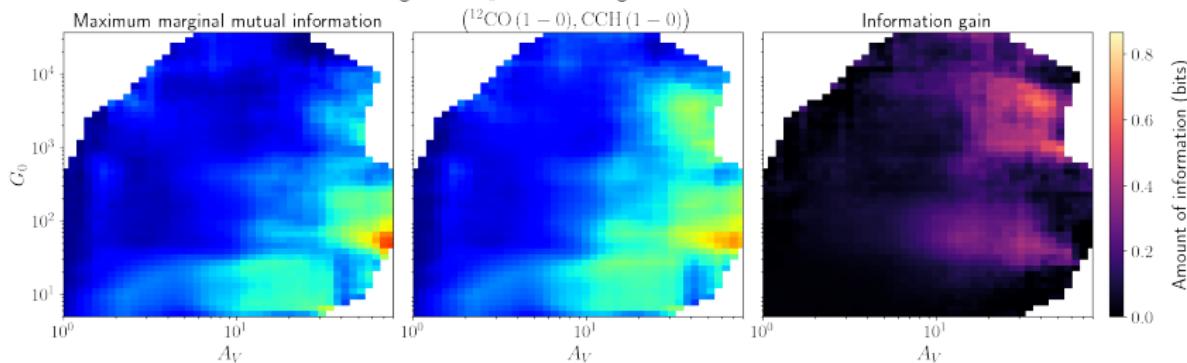


Informativity on G_0 of $(^{12}\text{CO}(1 - 0), \text{CCH}(1 - 0))$

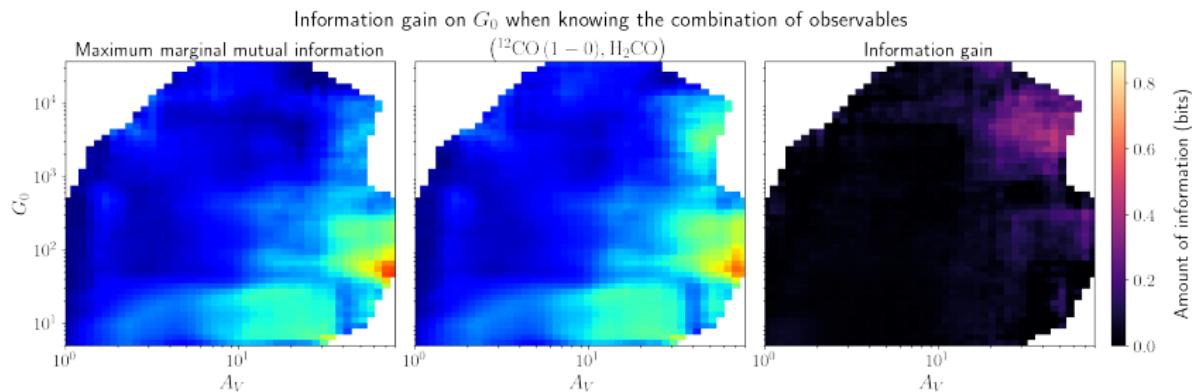
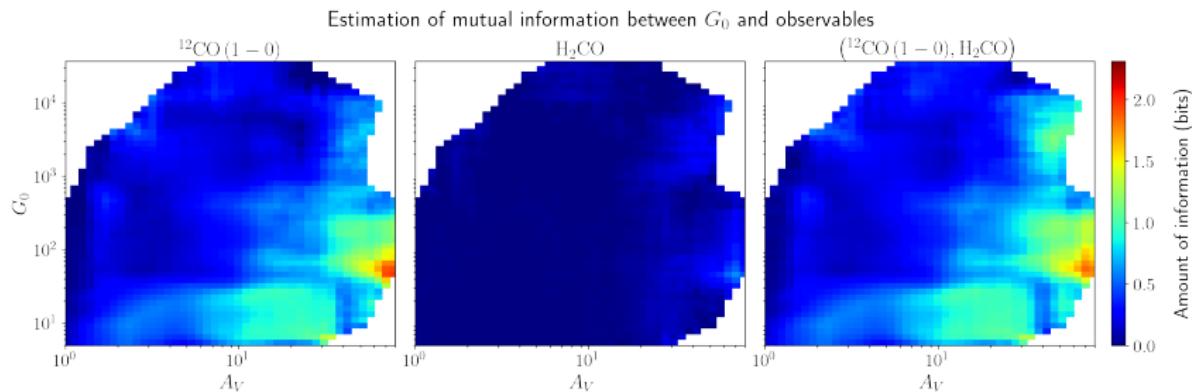
Estimation of mutual information between G_0 and observables



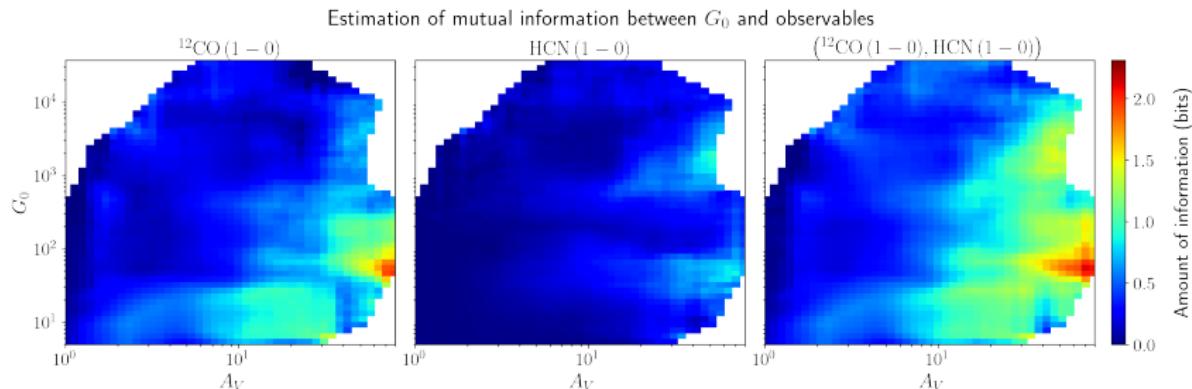
Information gain on G_0 when knowing the combination of observables



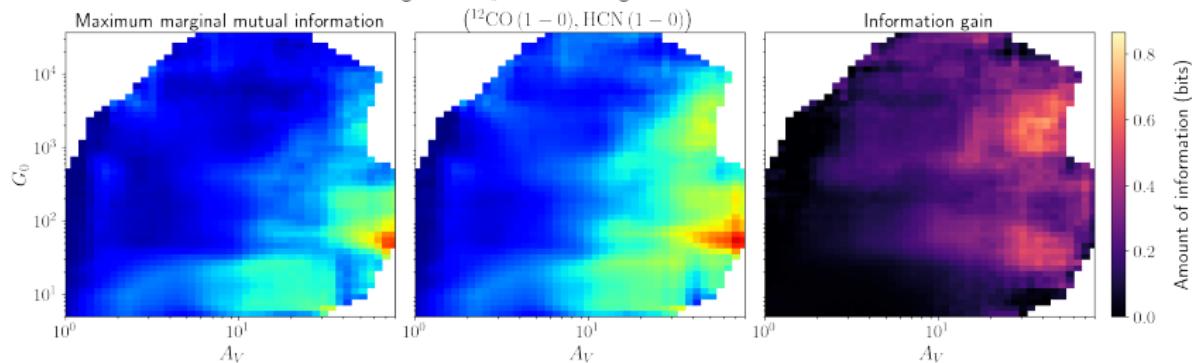
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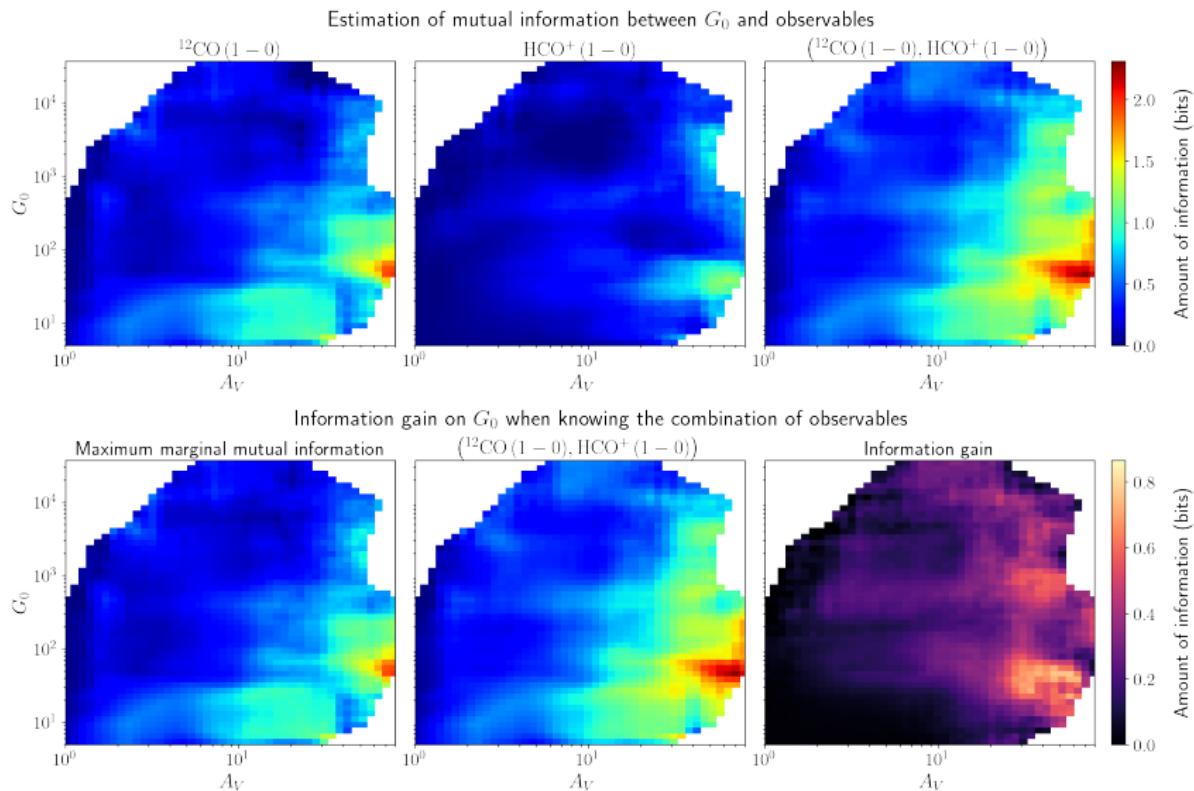
Informativity on G_0 of $(^{12}\text{CO} (1 - 0), \text{HCN} (1 - 0))$



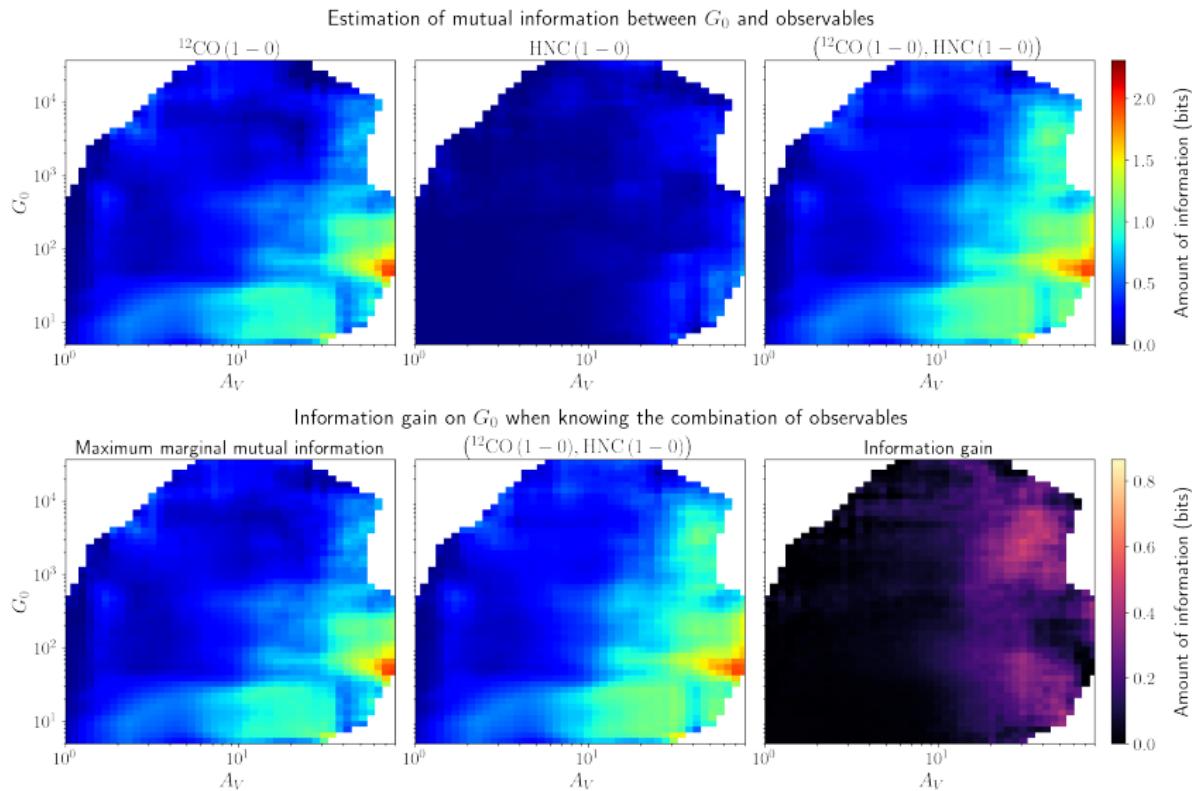
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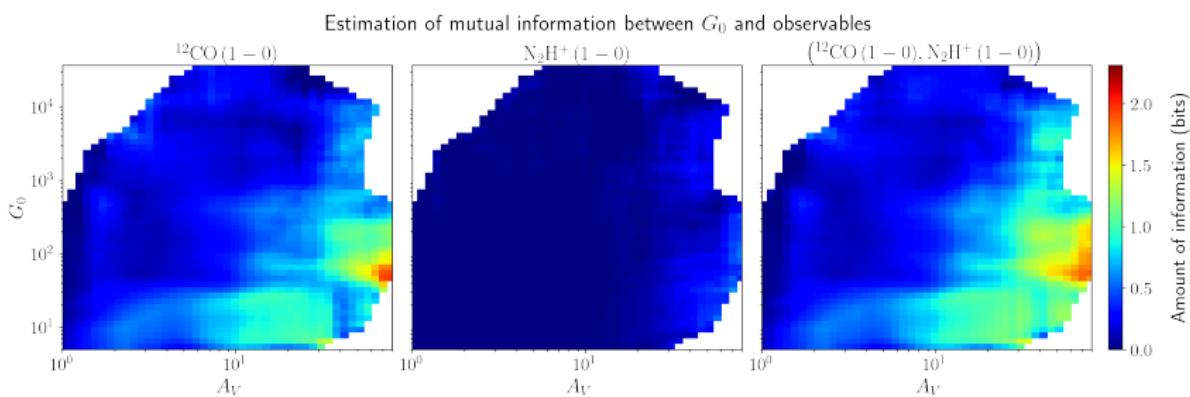
Informativity on G_0 of $(^{12}\text{CO} (1 - 0), \text{HCO}^+ (1 - 0))$



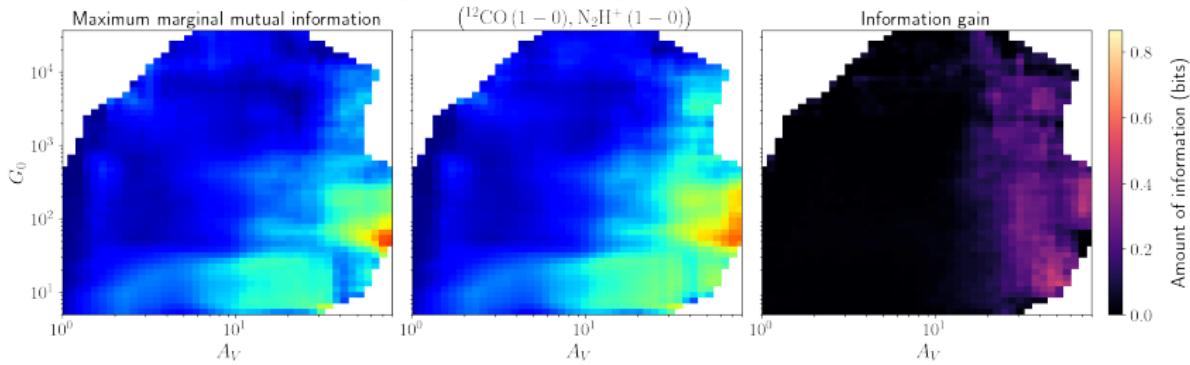
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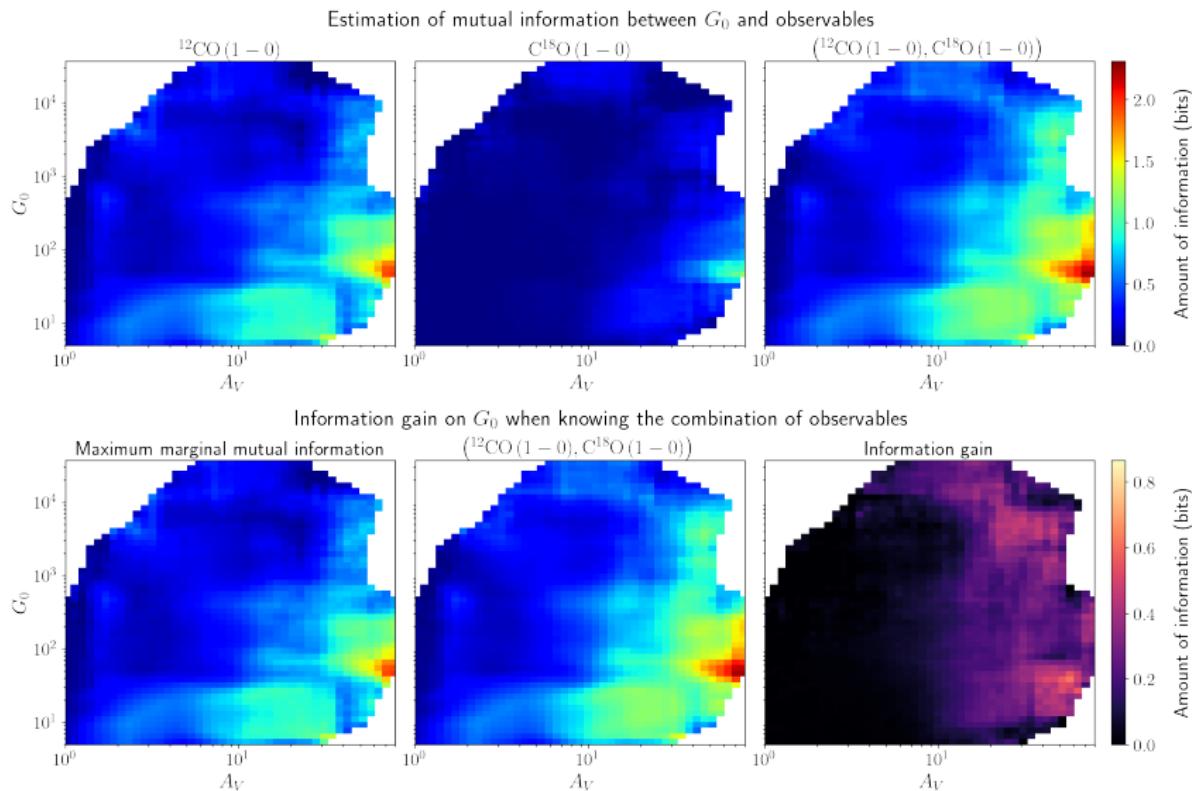
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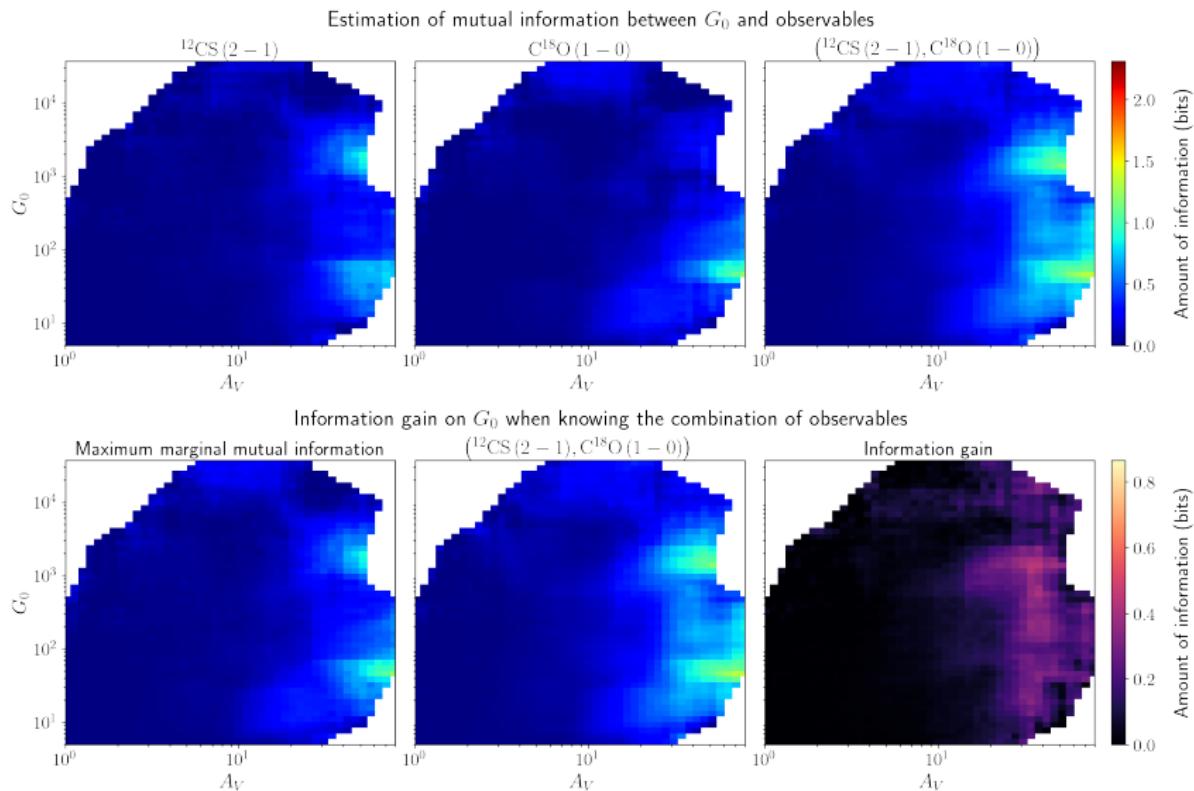
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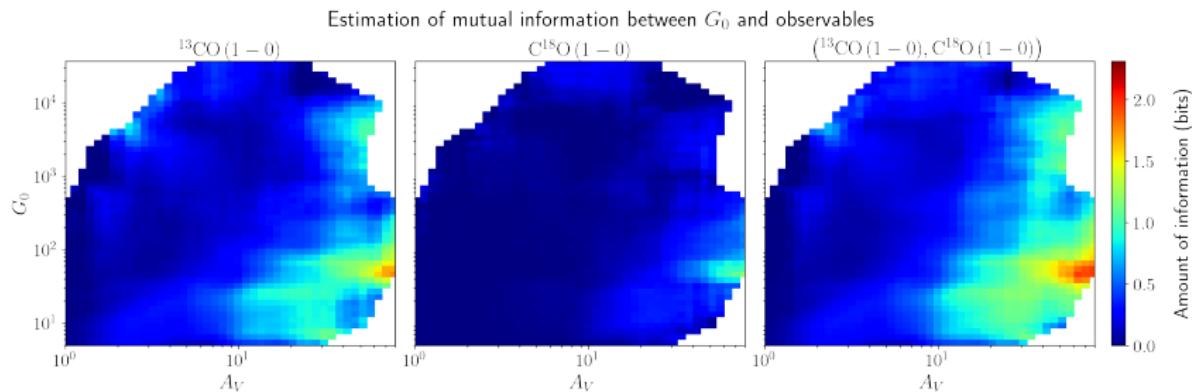
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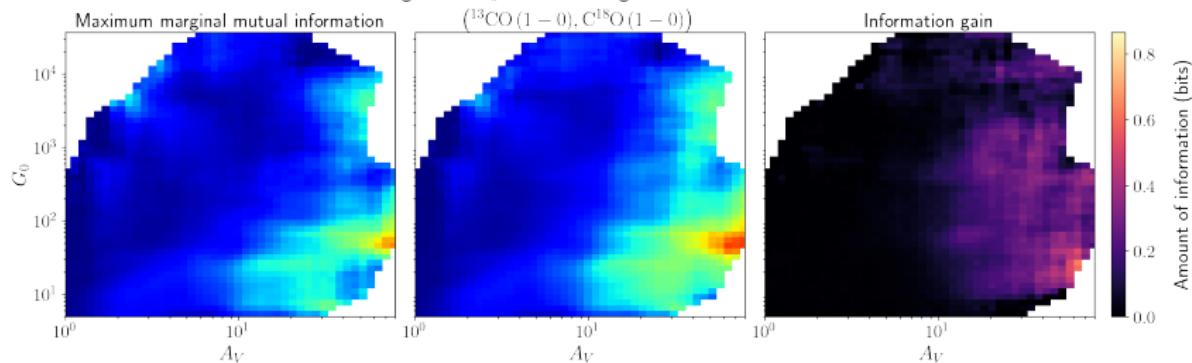
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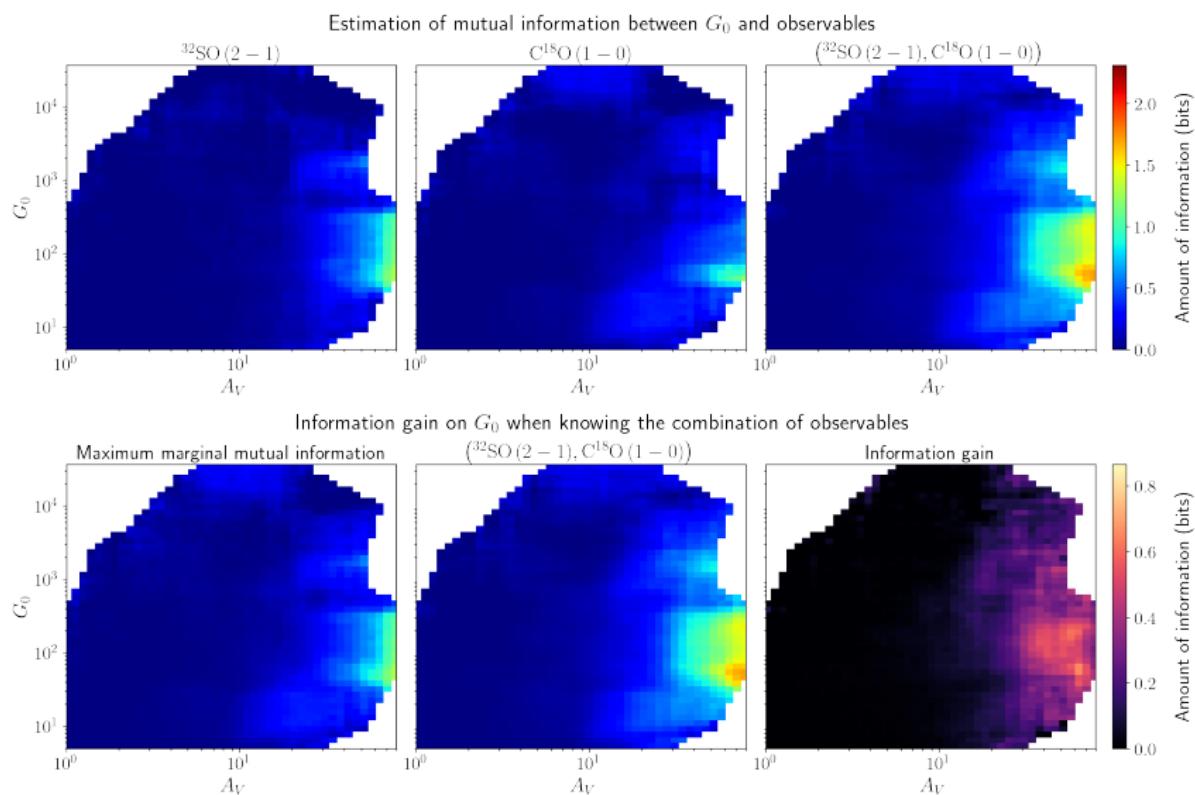
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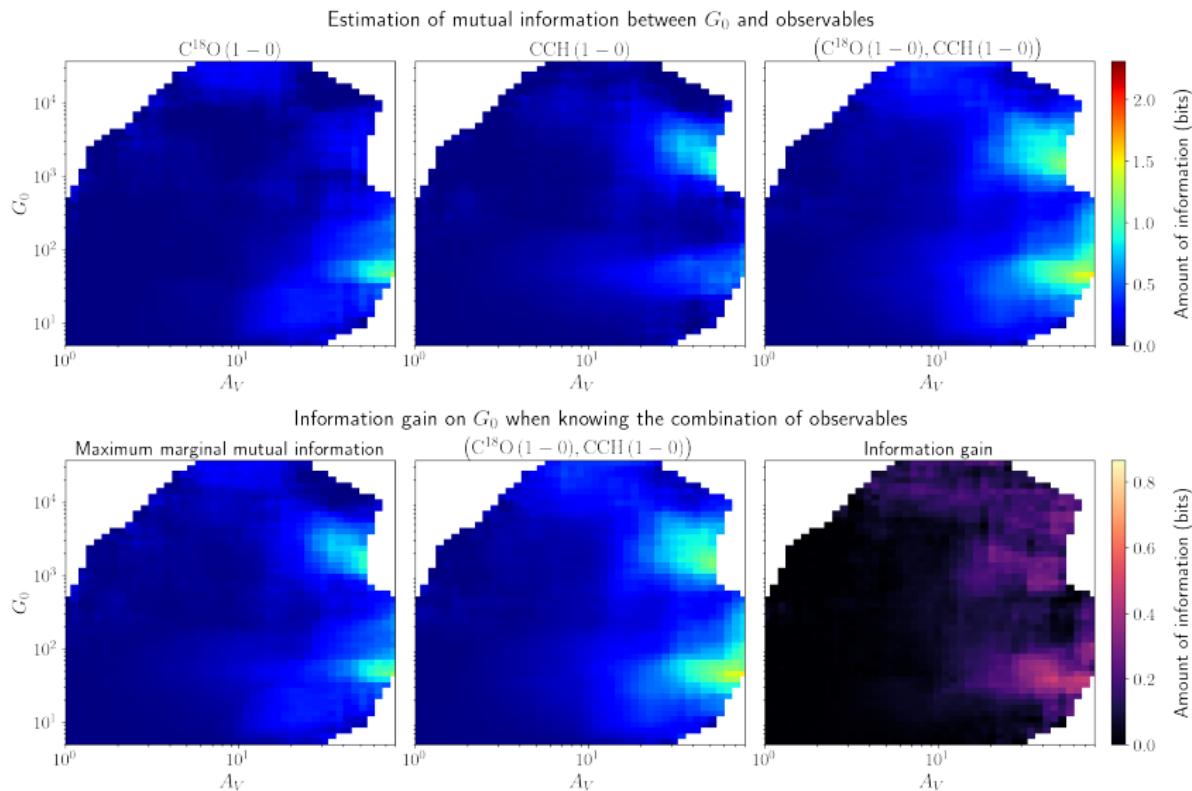
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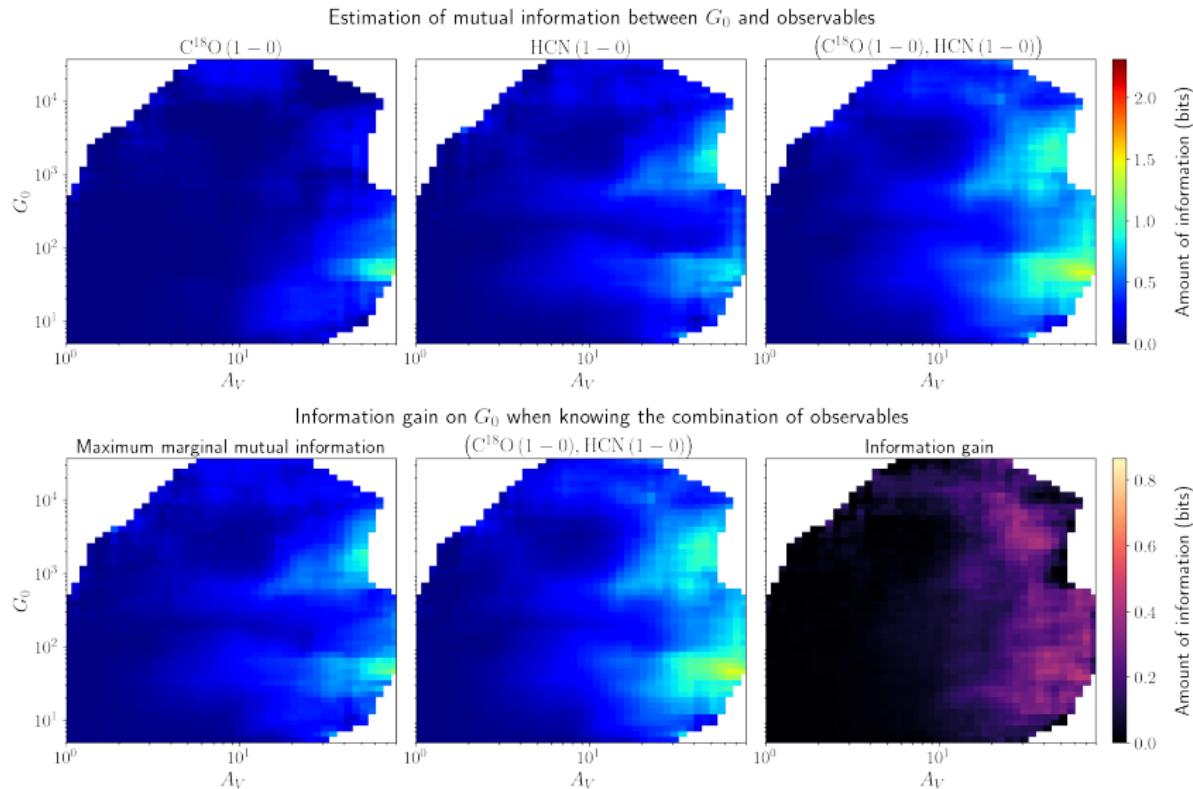
Informativity on G_0 of $(^{32}\text{SO} (2 - 1), \text{C}^{18}\text{O} (1 - 0))$



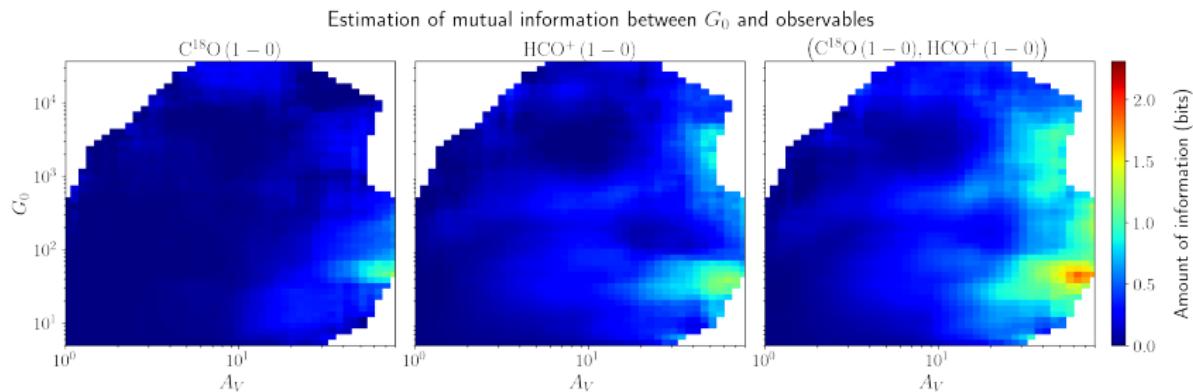
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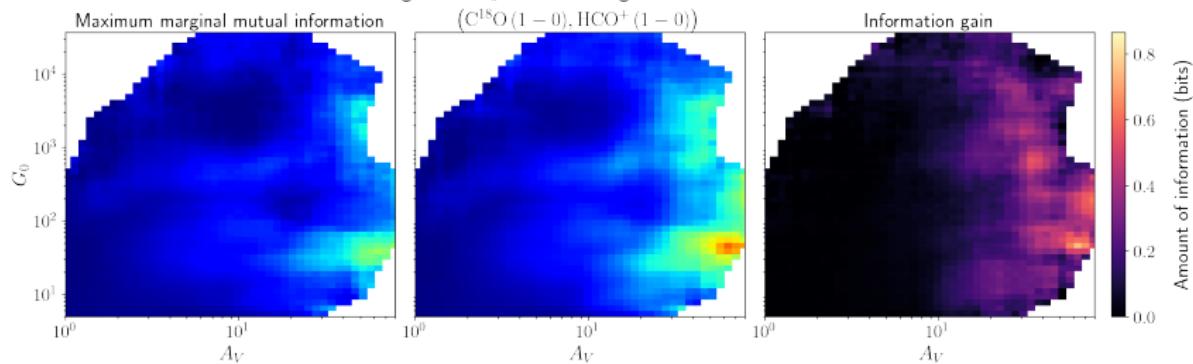
Informativity on G_0 of $(C^{18}O(1-0), HCN(1-0))$



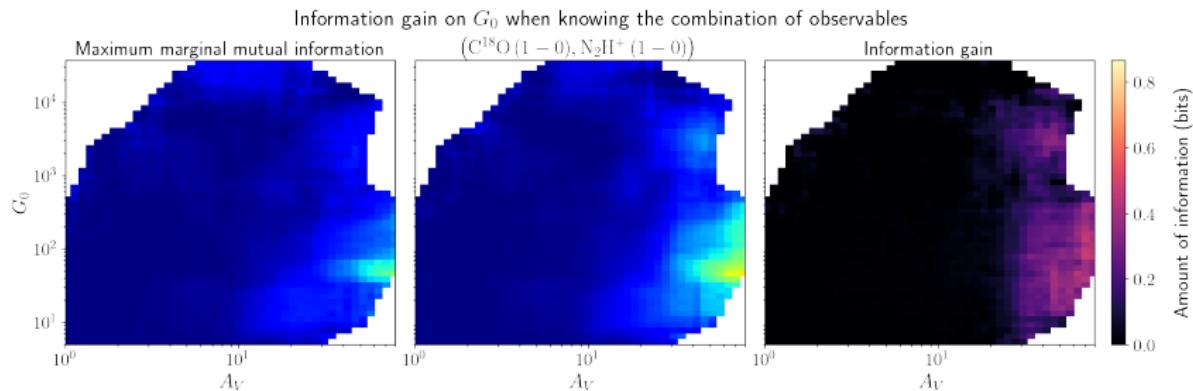
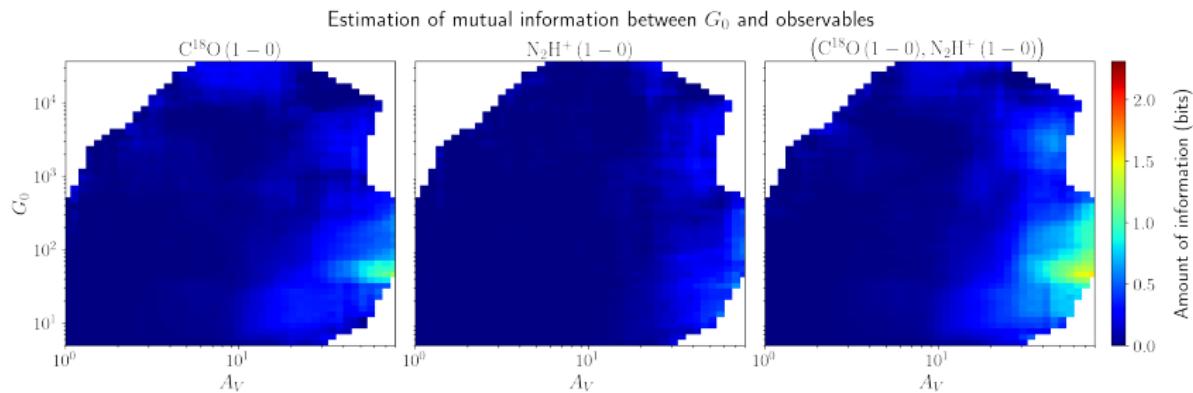
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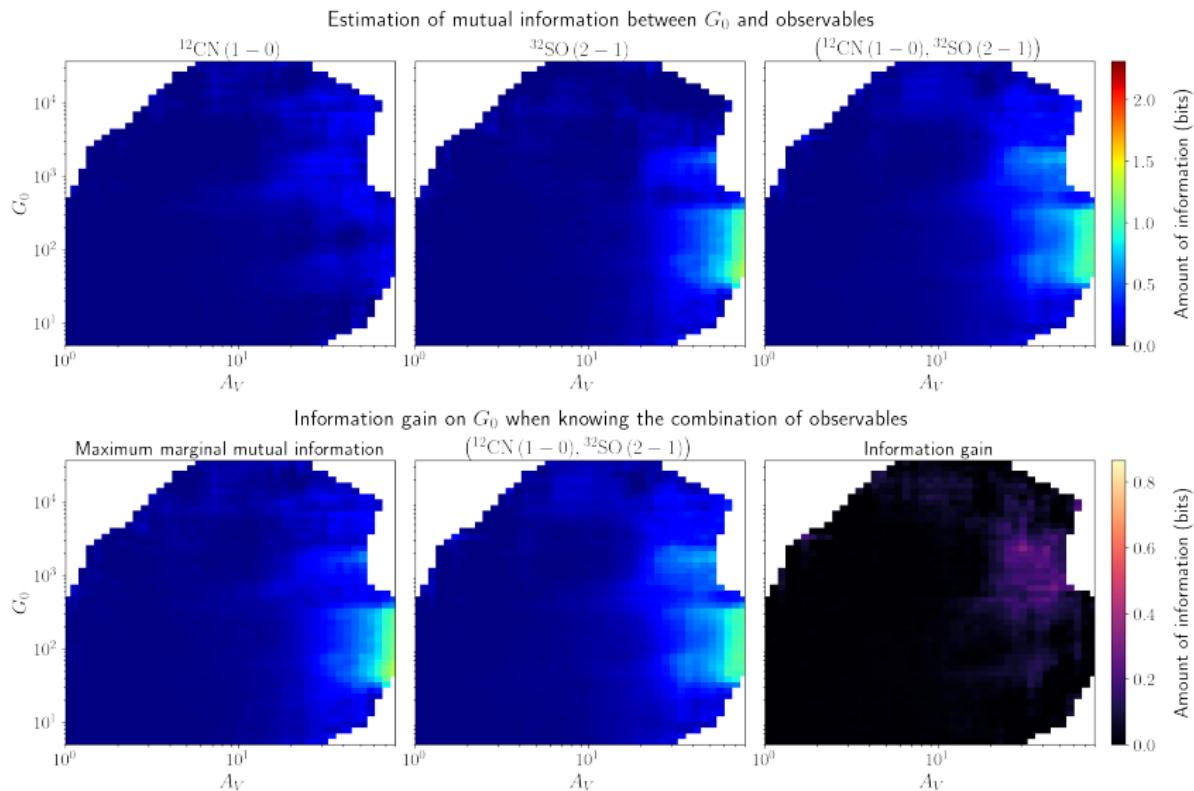
Informativity on G_0 of $(\text{C}^{18}\text{O} (1 - 0), \text{N}_2\text{H}^+ (1 - 0))$



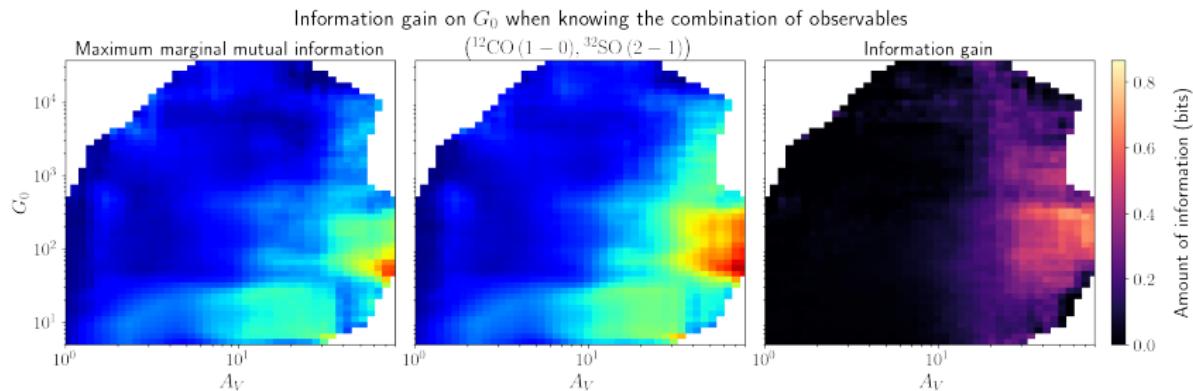
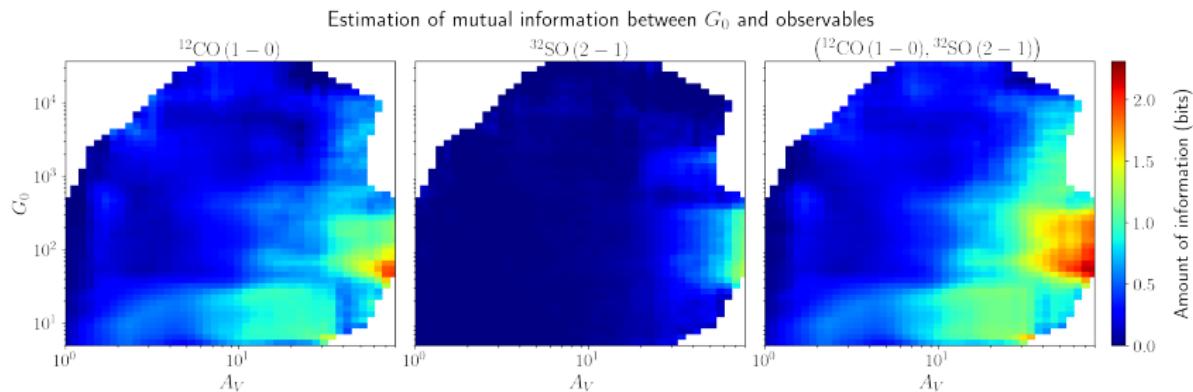
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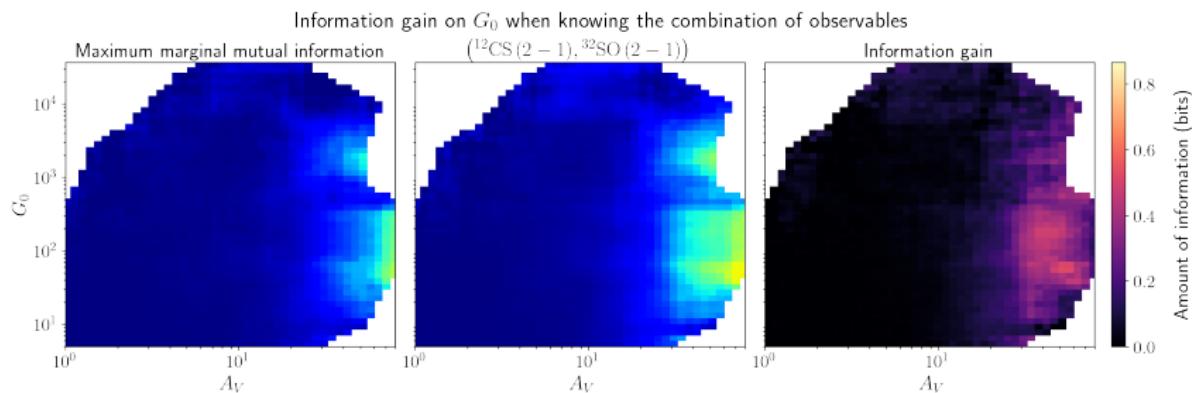
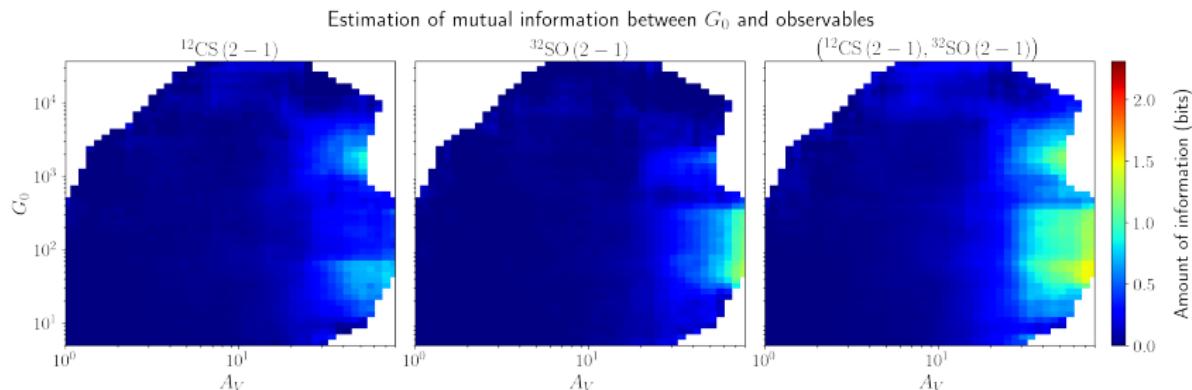
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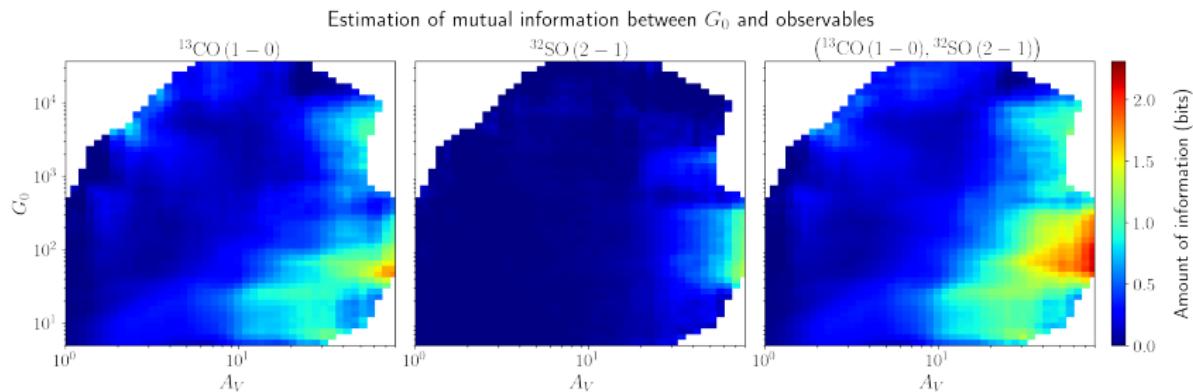
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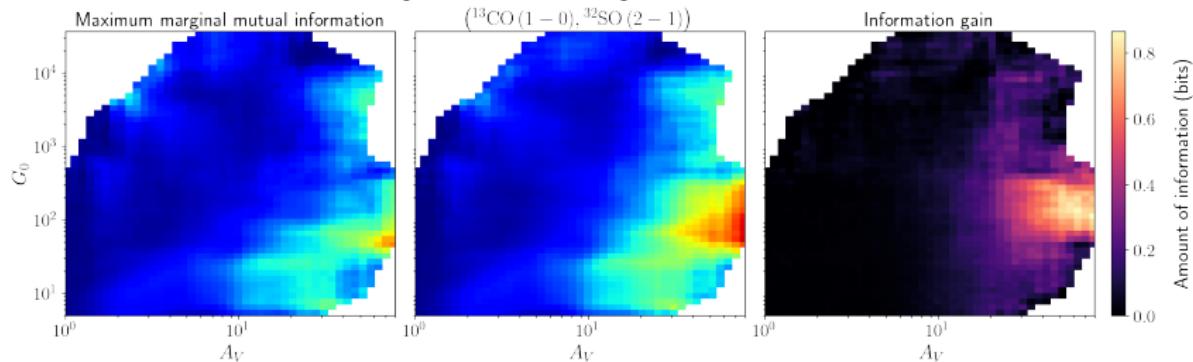
Informativity on G_0 of $(^{12}\text{CS} (2 - 1), ^{32}\text{SO} (2 - 1))$



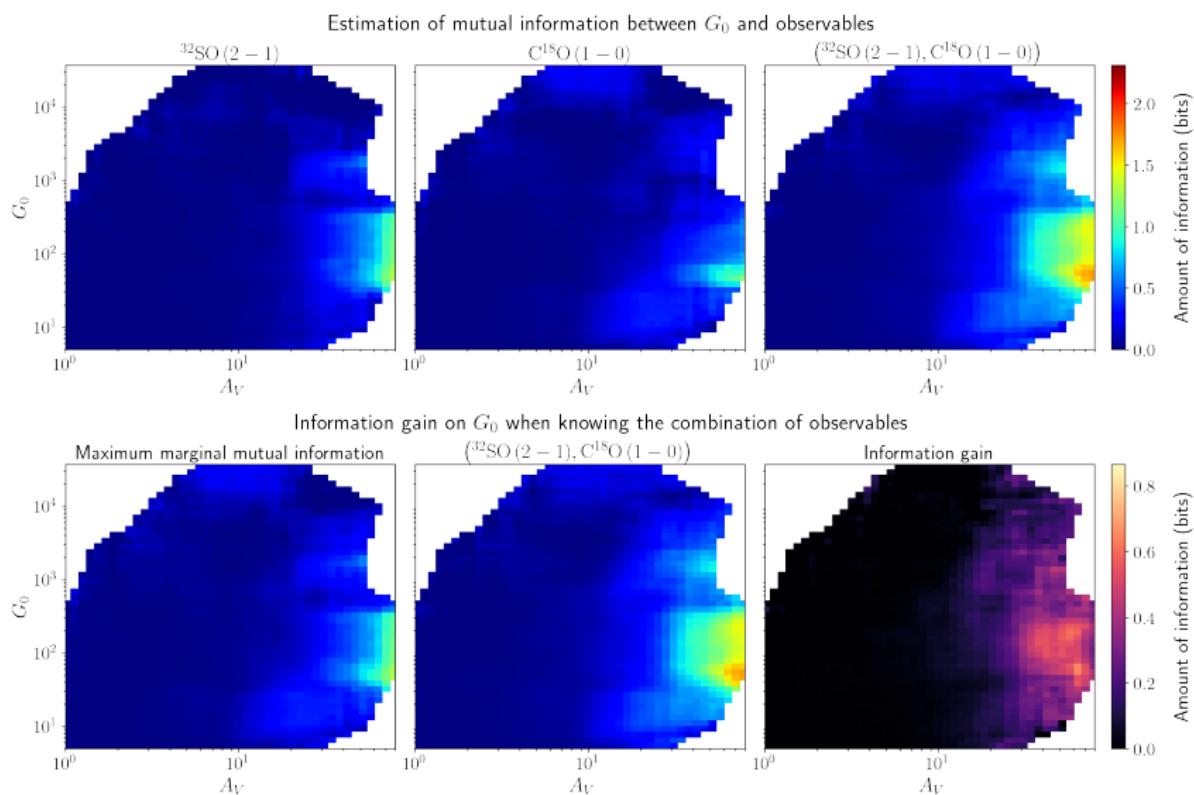
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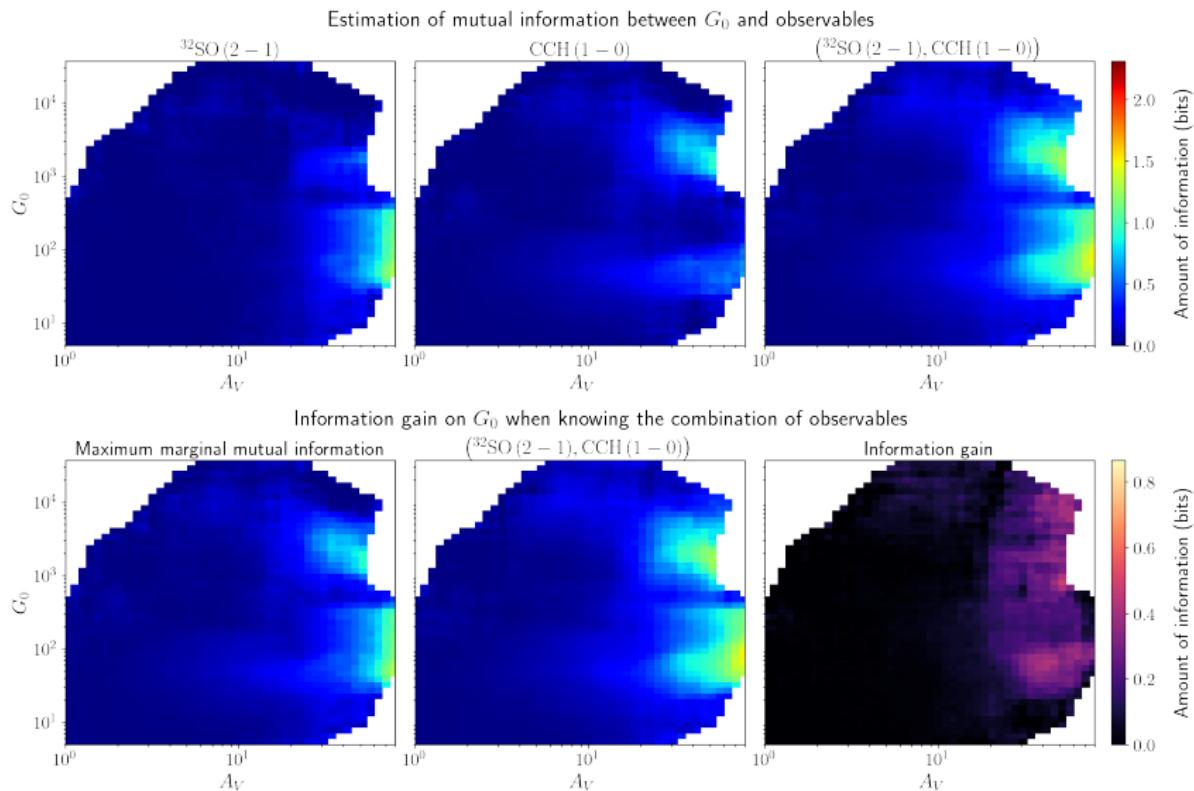
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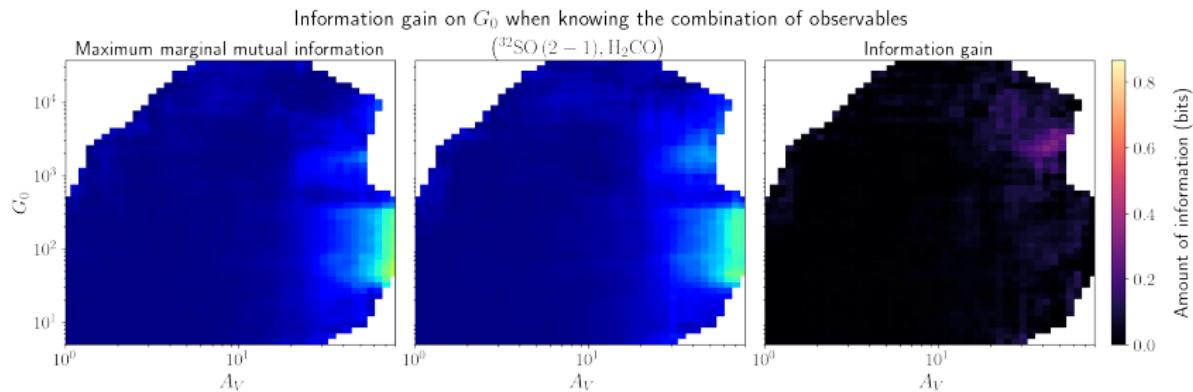
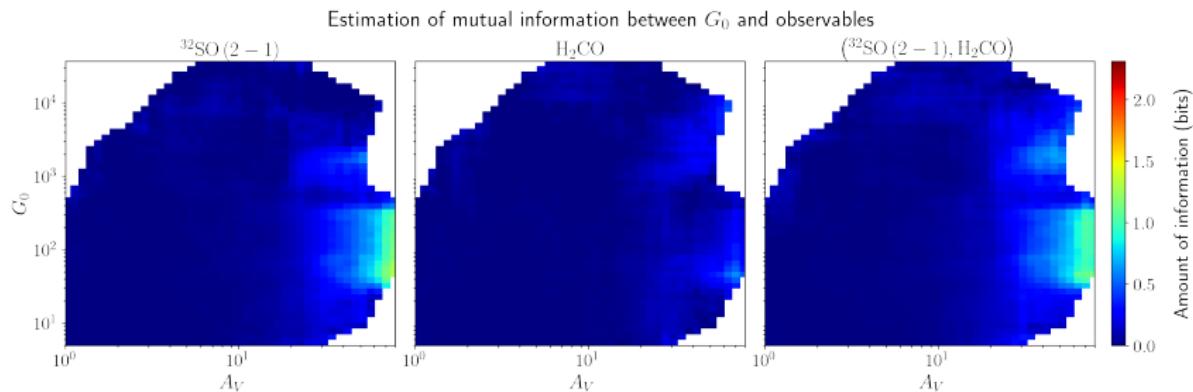
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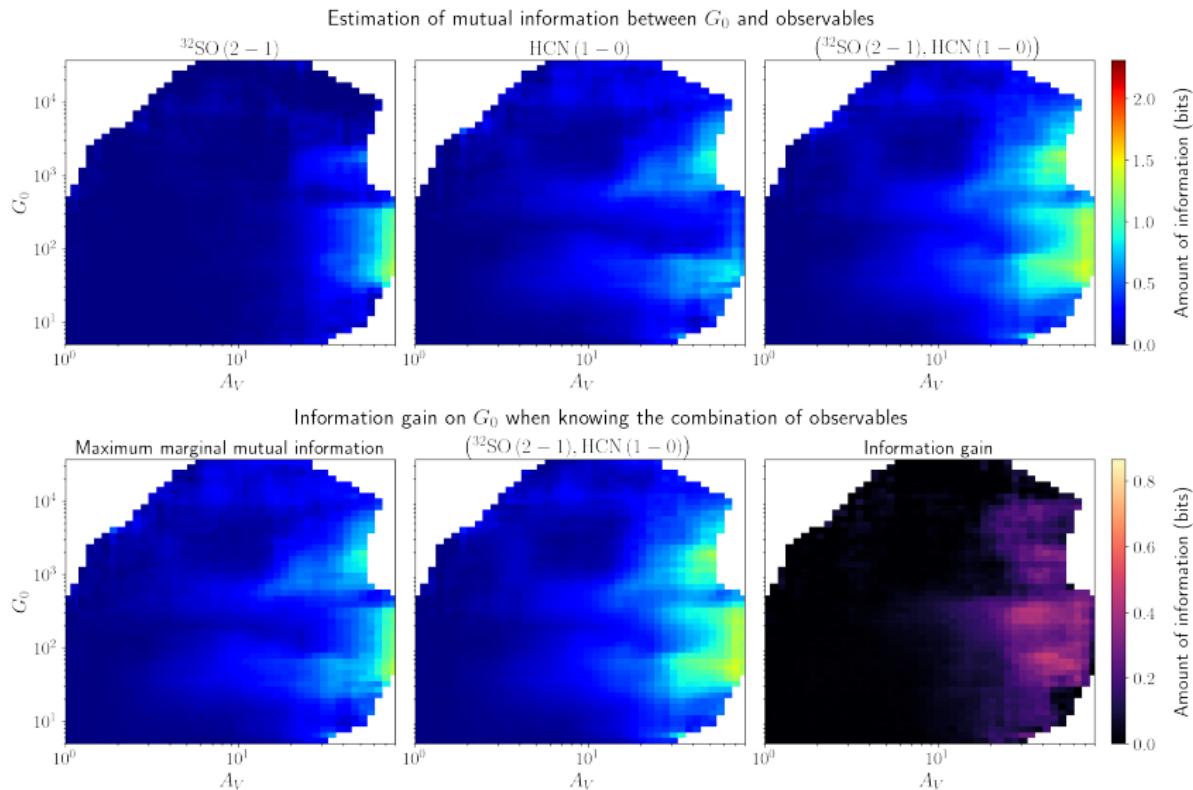
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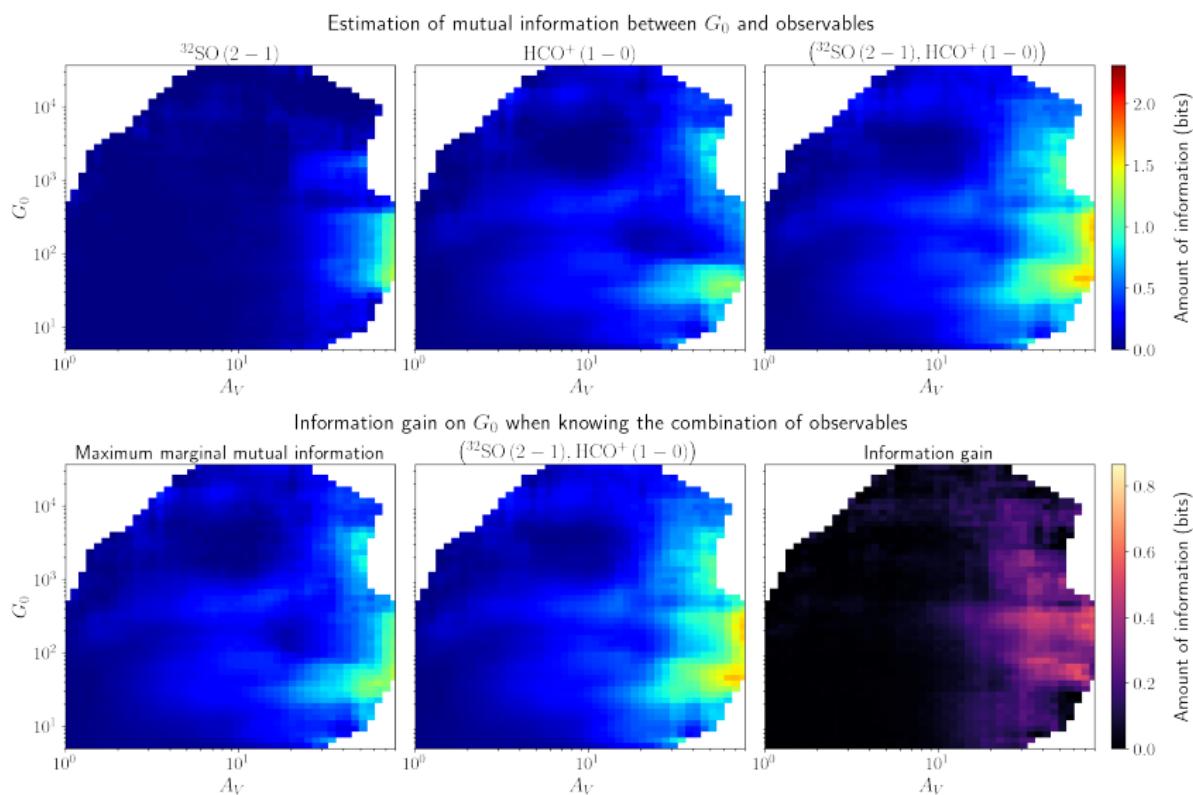
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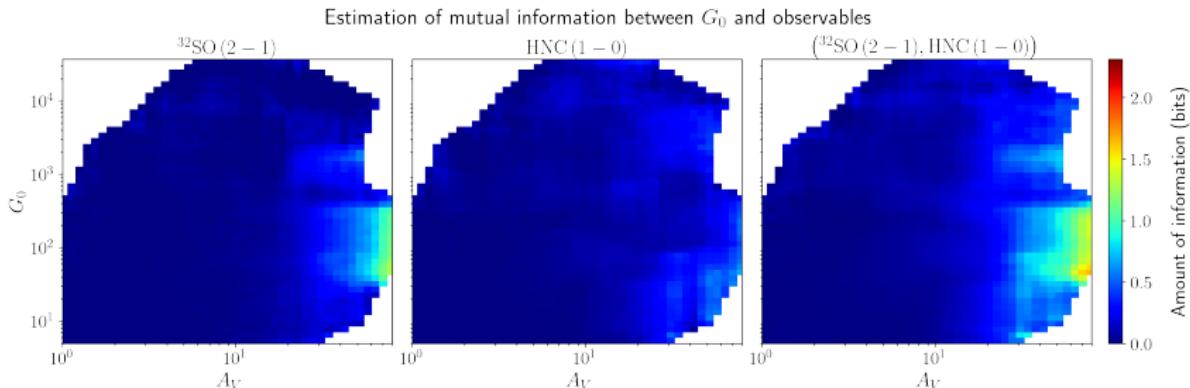
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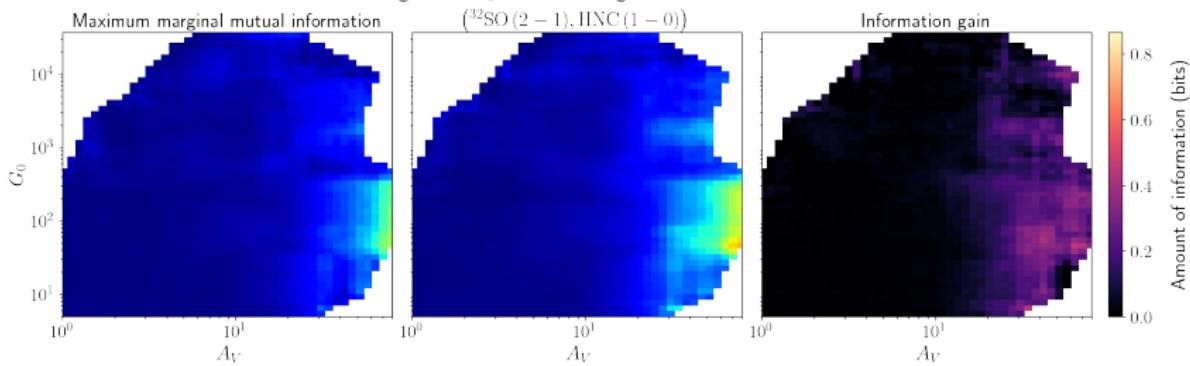
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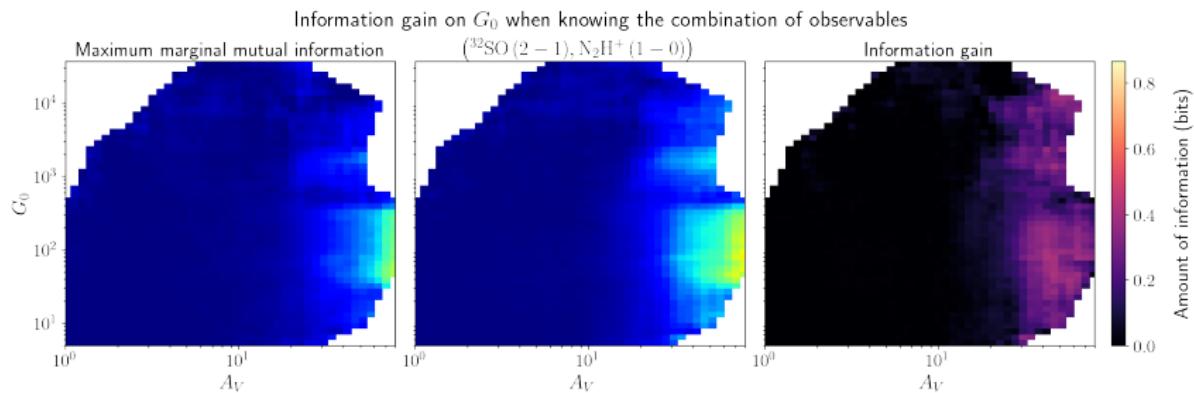
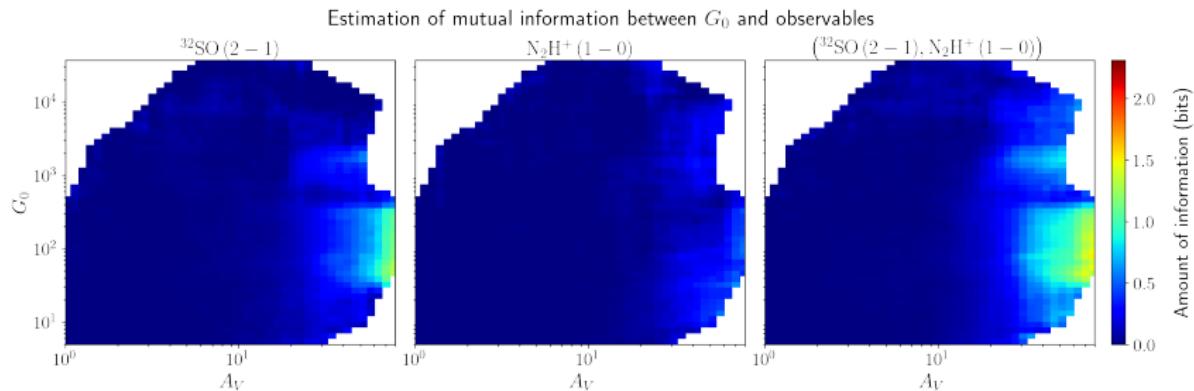
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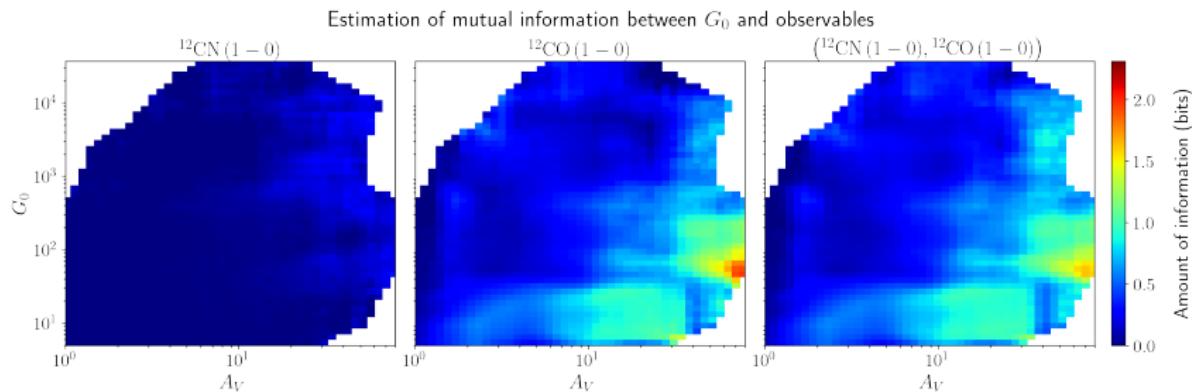
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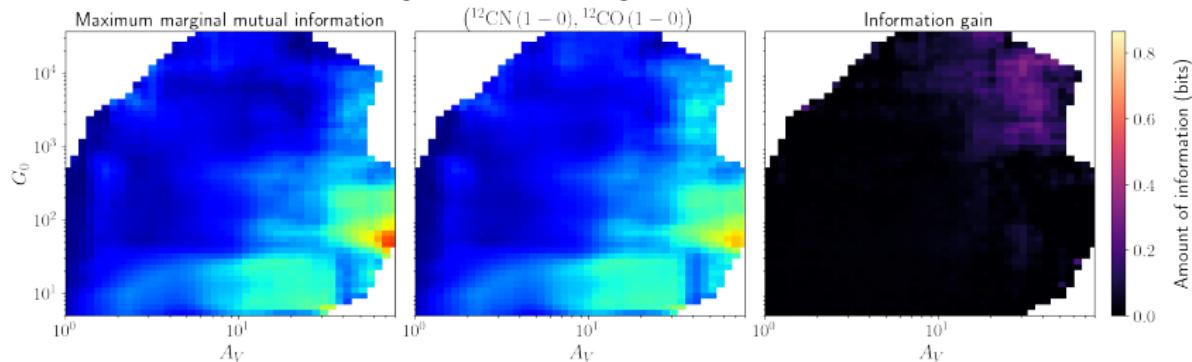
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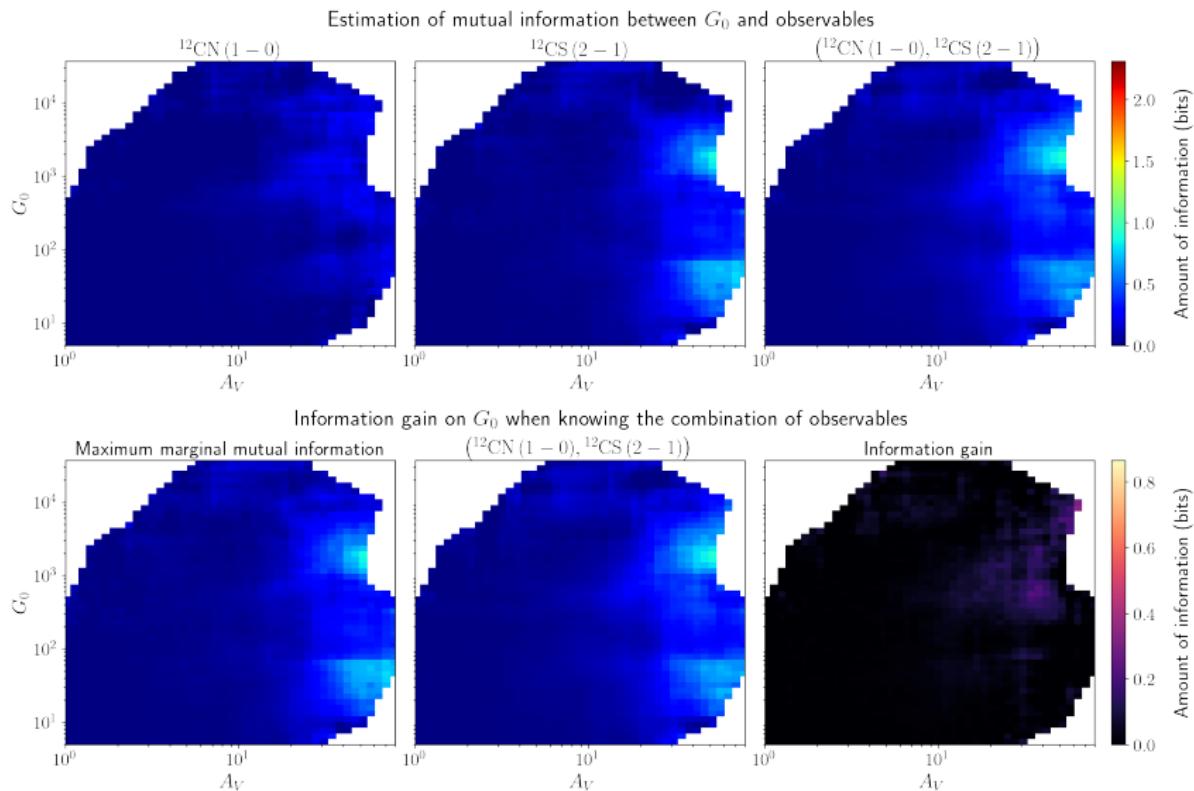
Informativity on G_0 of $(^{12}\text{CN}\,(1 - 0), ^{12}\text{CO}\,(1 - 0))$



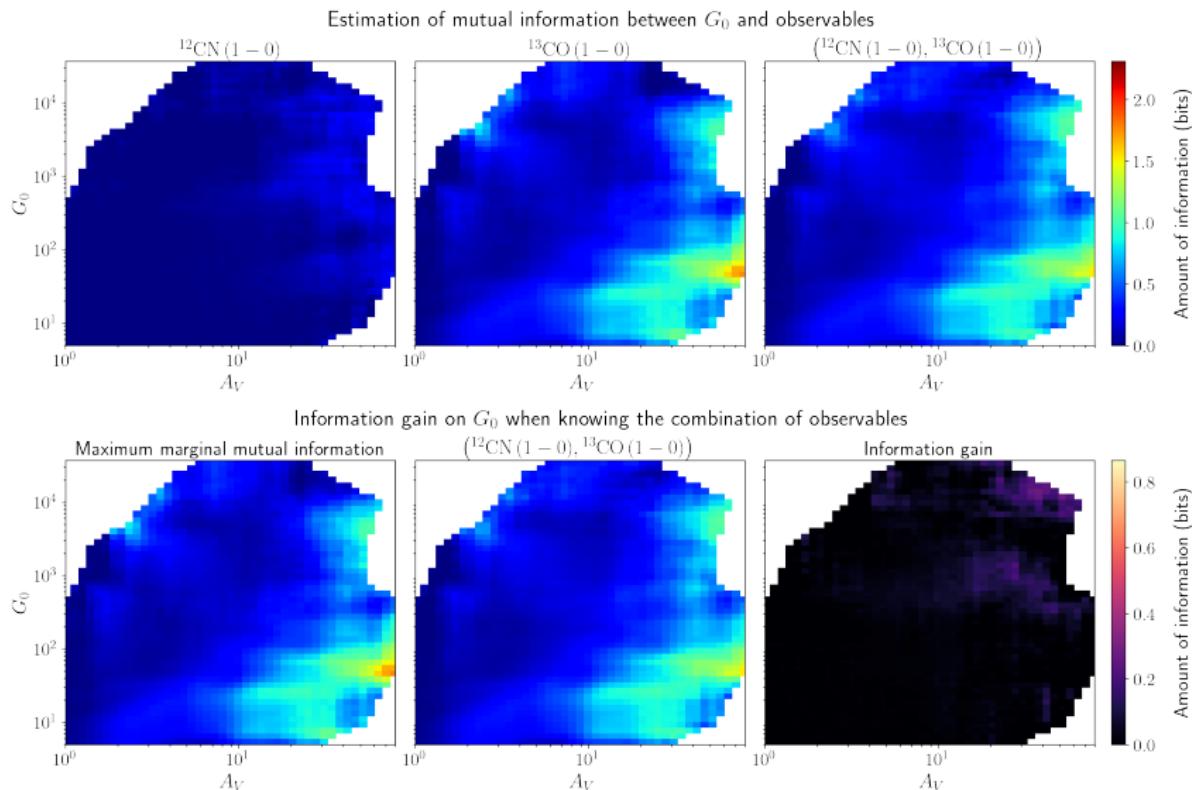
Information gain on G_0 when knowing the combination of observables



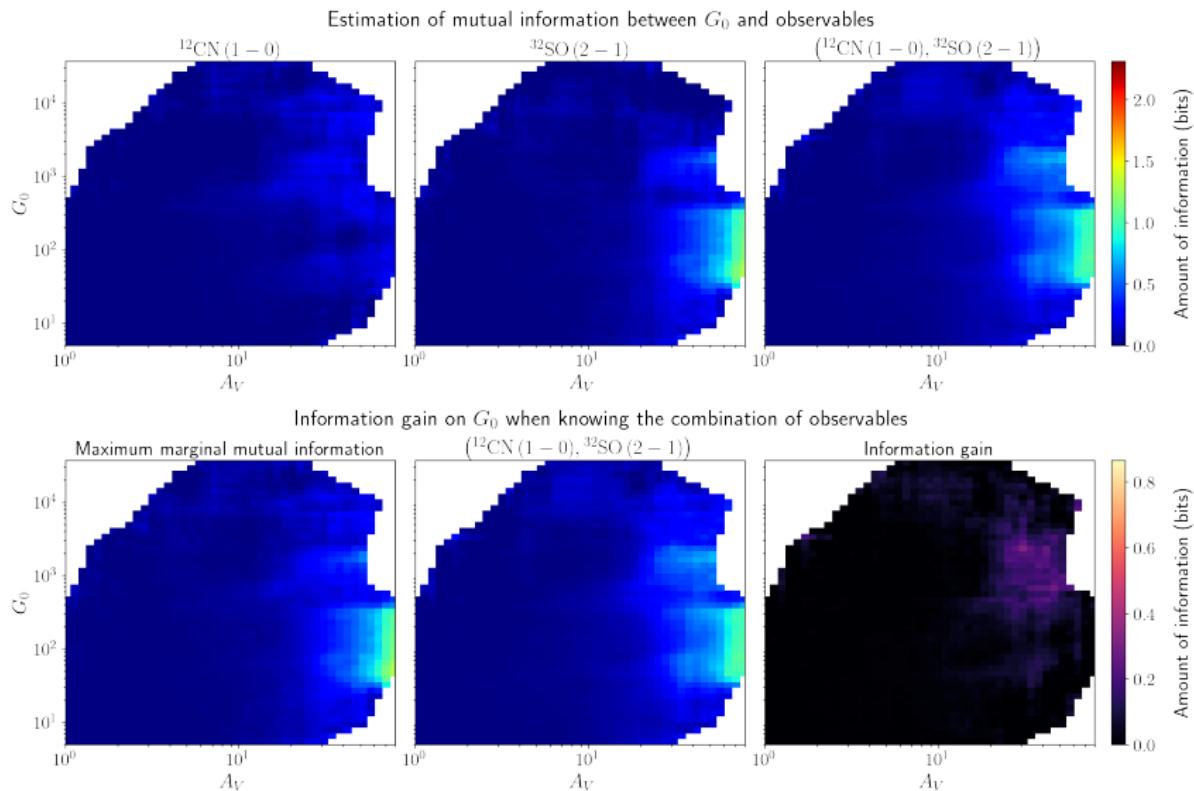
Informativity on G_0 of $(^{12}\text{CN}(1 - 0), ^{12}\text{CS}(2 - 1))$



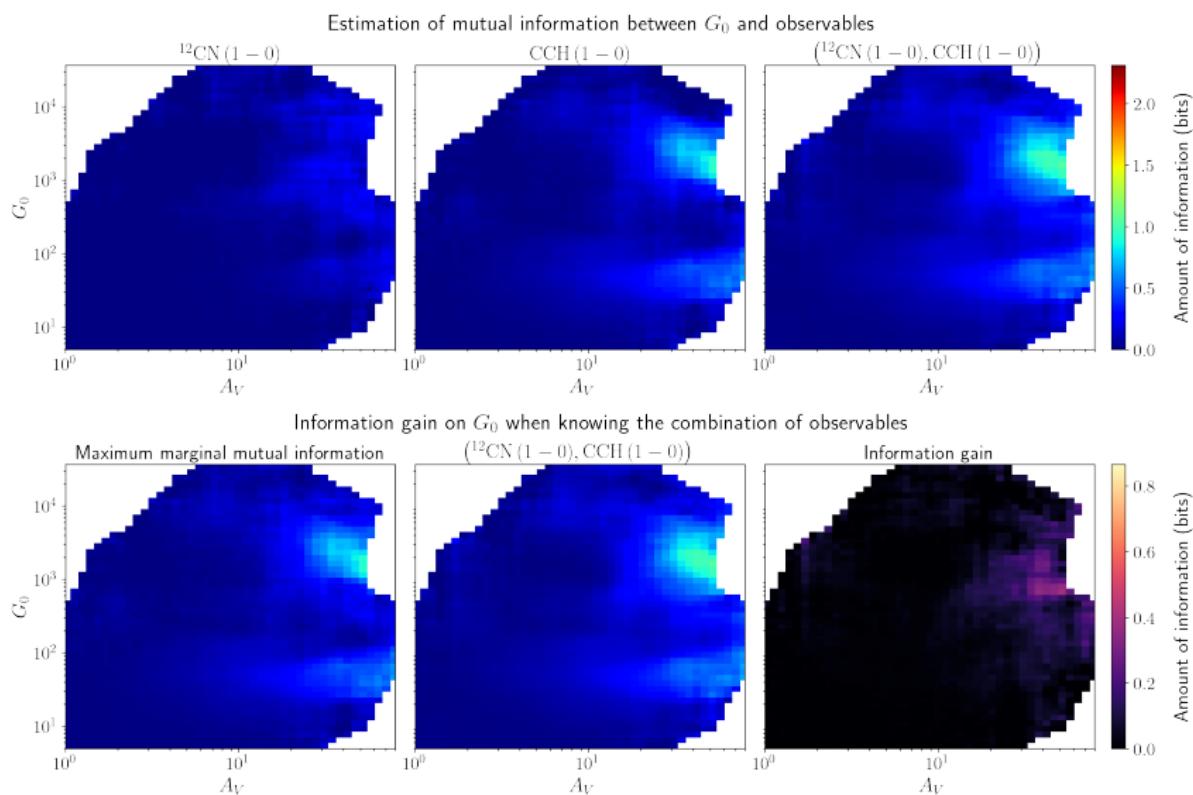
Informativity on G_0 of $(^{12}\text{CN}(1 - 0), ^{13}\text{CO}(1 - 0))$



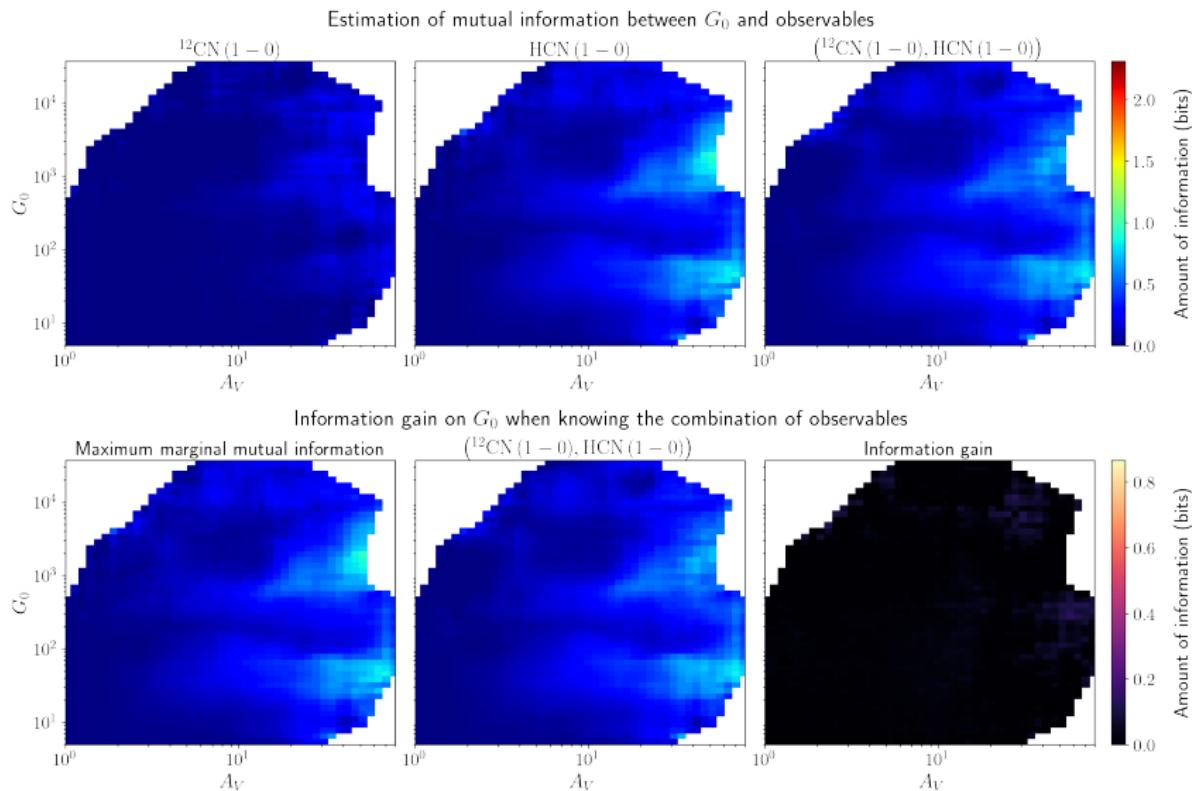
Informativity on G_0 of $(^{12}\text{CN}\,(1-0), ^{32}\text{SO}\,(2-1))$



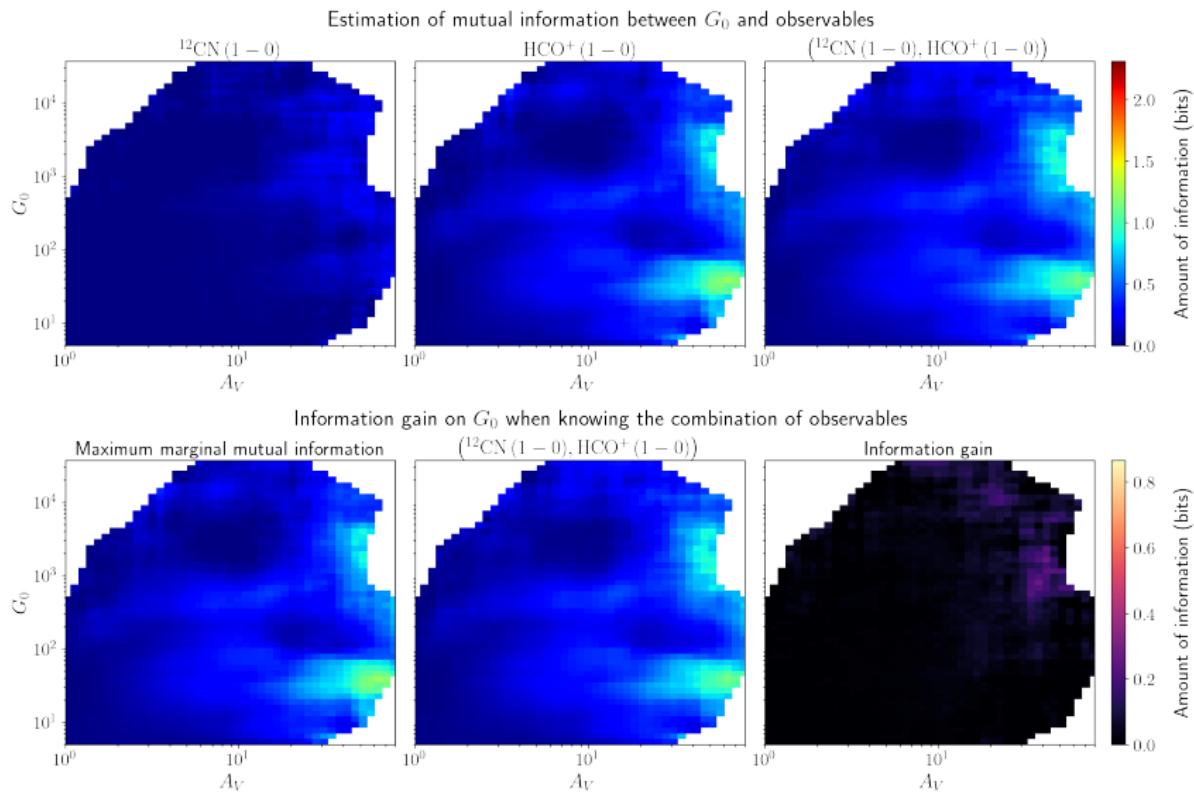
Informativity on G_0 of $(^{12}\text{CN}(1 - 0), \text{CCH}(1 - 0))$



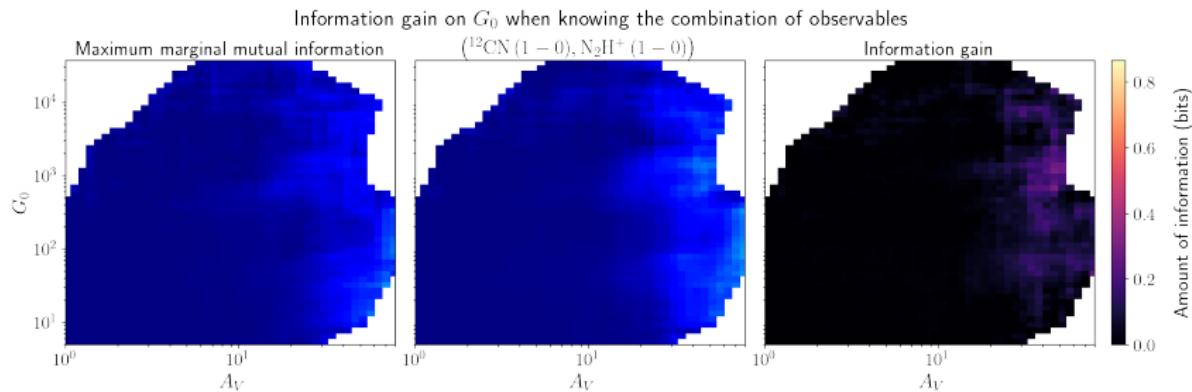
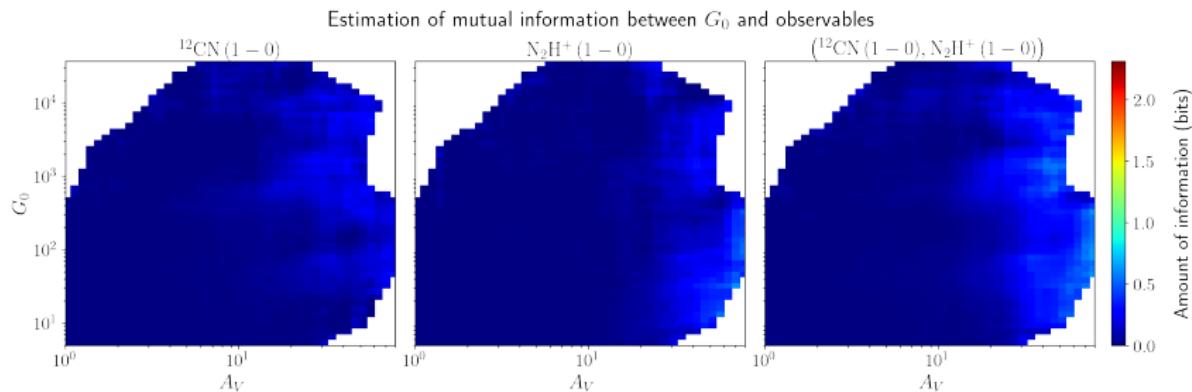
Informativity on G_0 of $(^{12}\text{CN}(1 - 0), \text{HCN}(1 - 0))$



Informativity on G_0 of $(^{12}\text{CN}(1 - 0), \text{HCO}^+(1 - 0))$



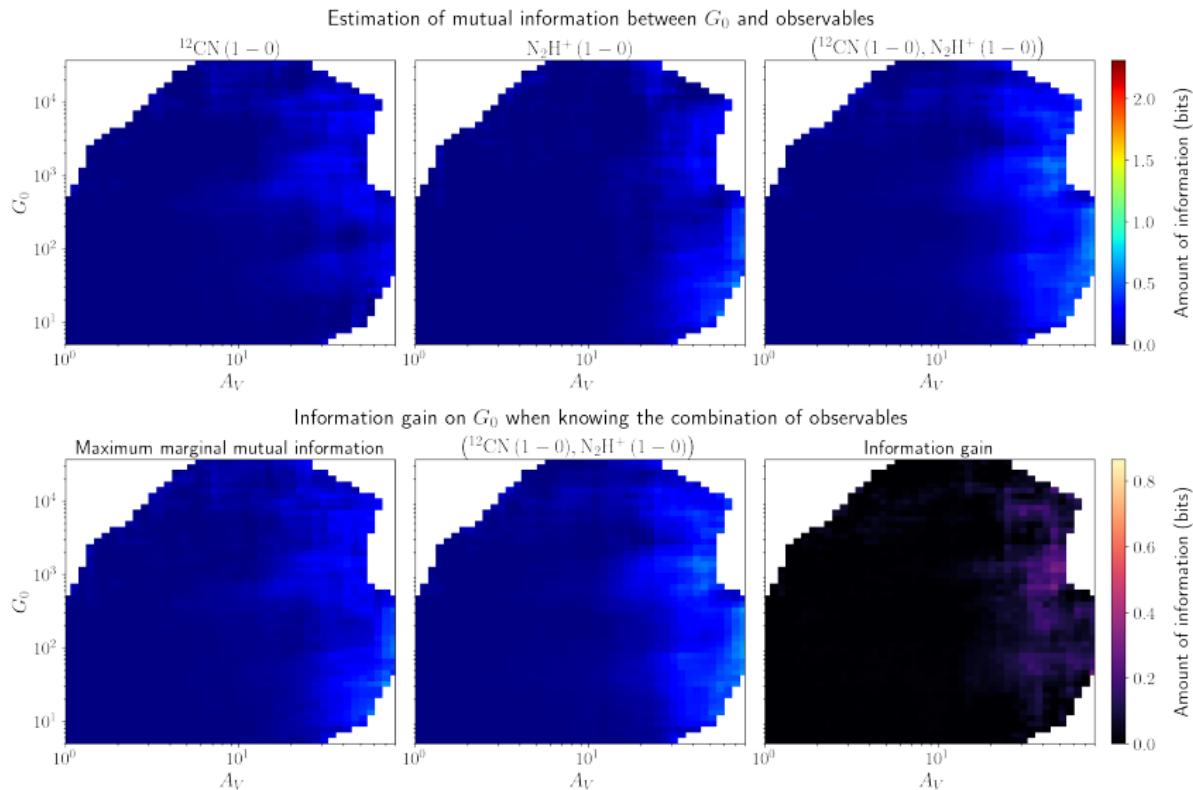
Informativity on G_0 of $(^{12}\text{CN}(1 - 0), \text{N}_2\text{H}^+(1 - 0))$



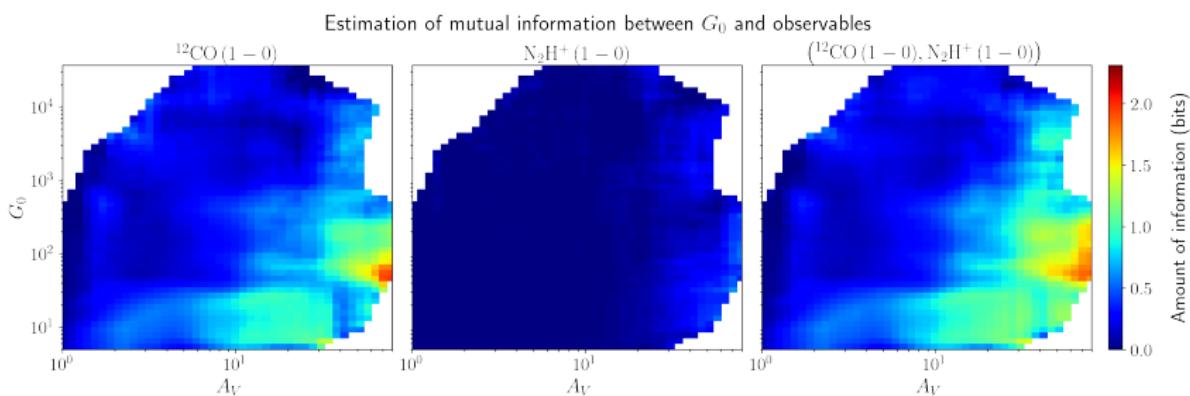
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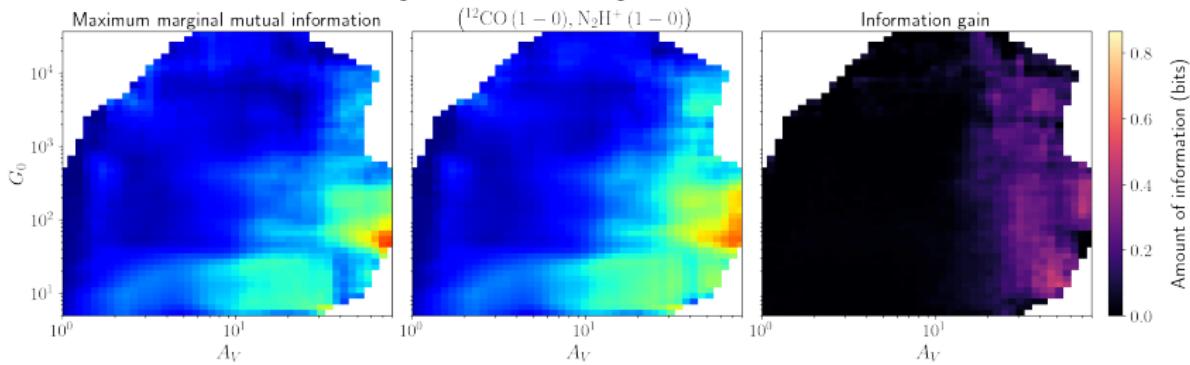
Informativity on G_0 of $(^{12}\text{CN}(1 - 0), \text{N}_2\text{H}^+(1 - 0))$



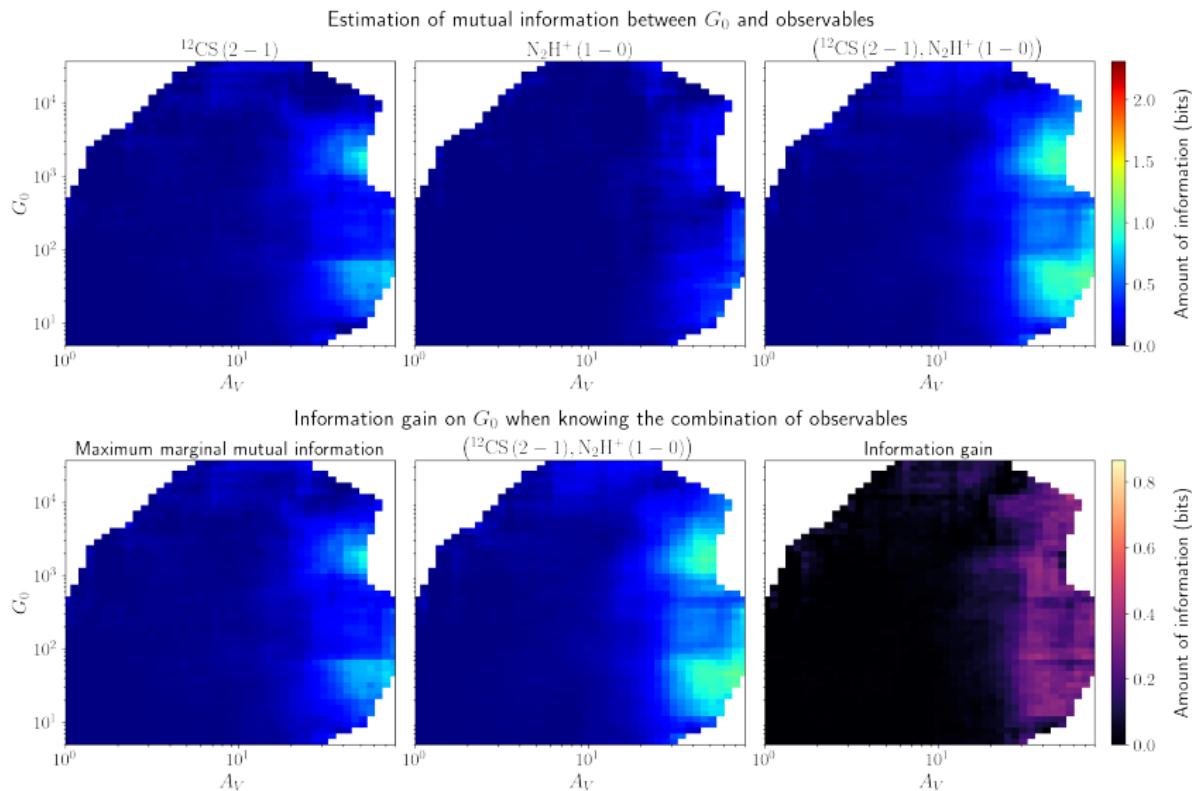
Informativity on G_0 of $(^{12}\text{CO}(1 - 0), \text{N}_2\text{H}^+(1 - 0))$



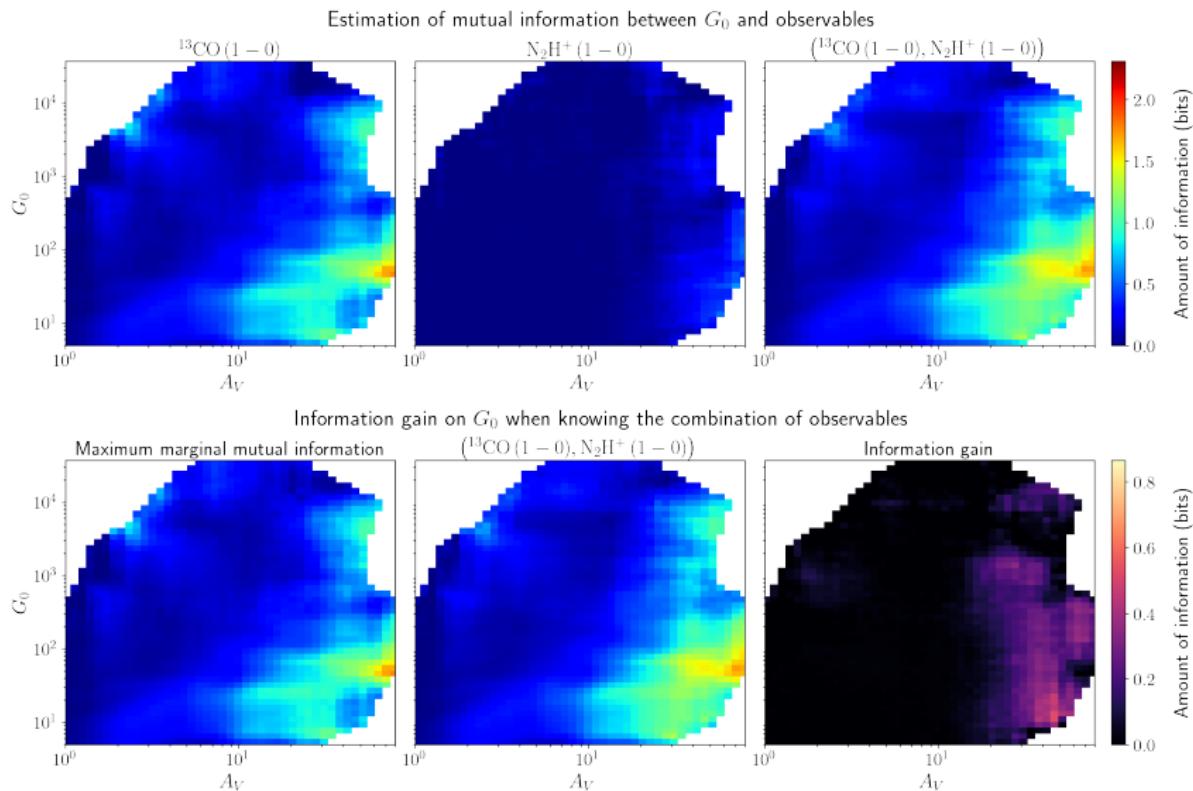
Information gain on G_0 when knowing the combination of observables



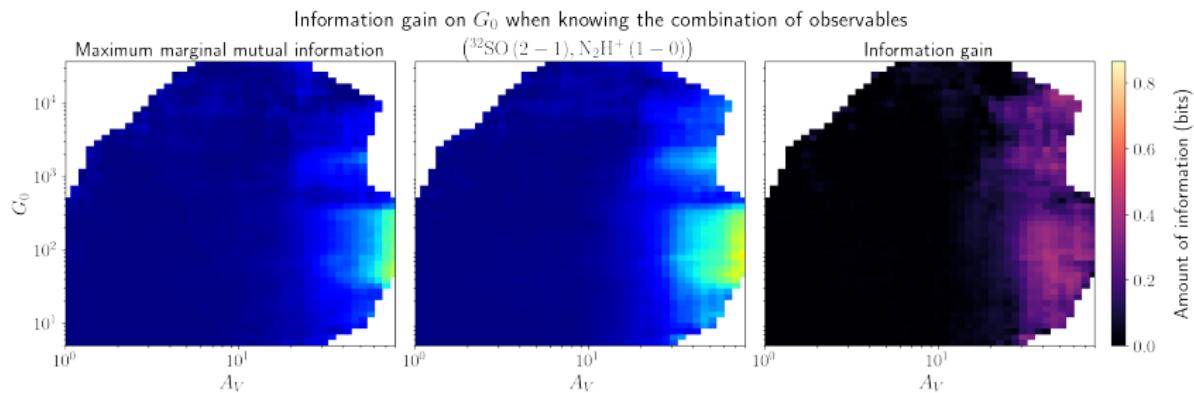
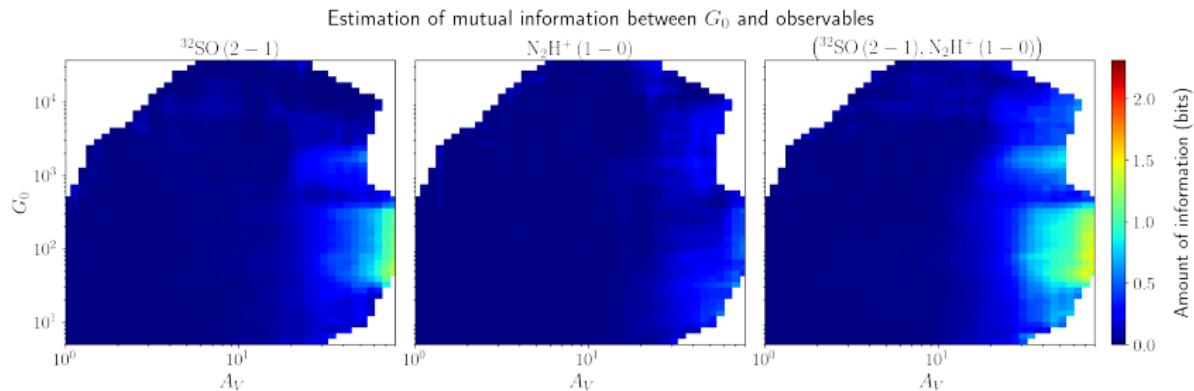
Informativity on G_0 of $(^{12}\text{CS} (2 - 1), \text{N}_2\text{H}^+ (1 - 0))$



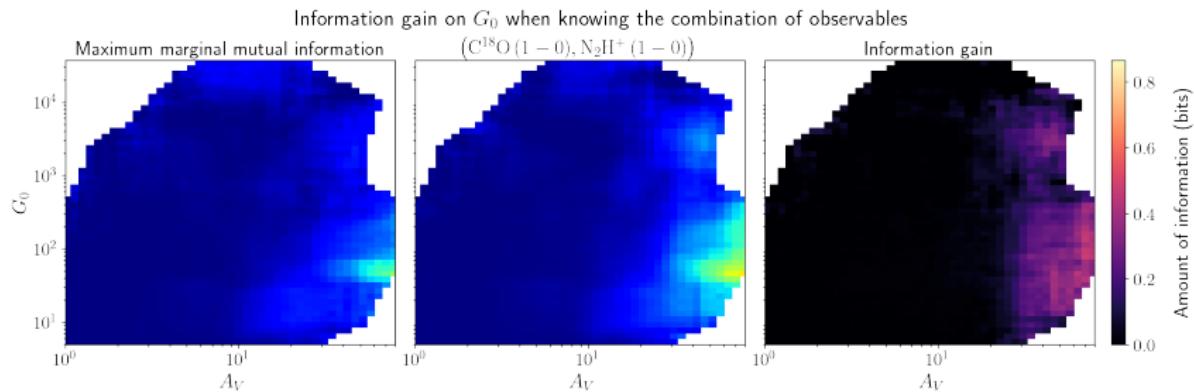
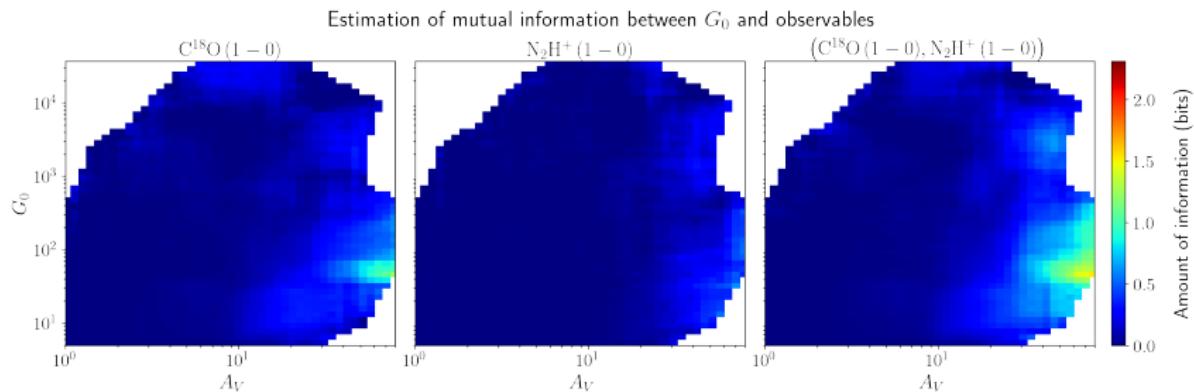
Informativity on G_0 of $(^{13}\text{CO} (1 - 0), \text{N}_2\text{H}^+ (1 - 0))$



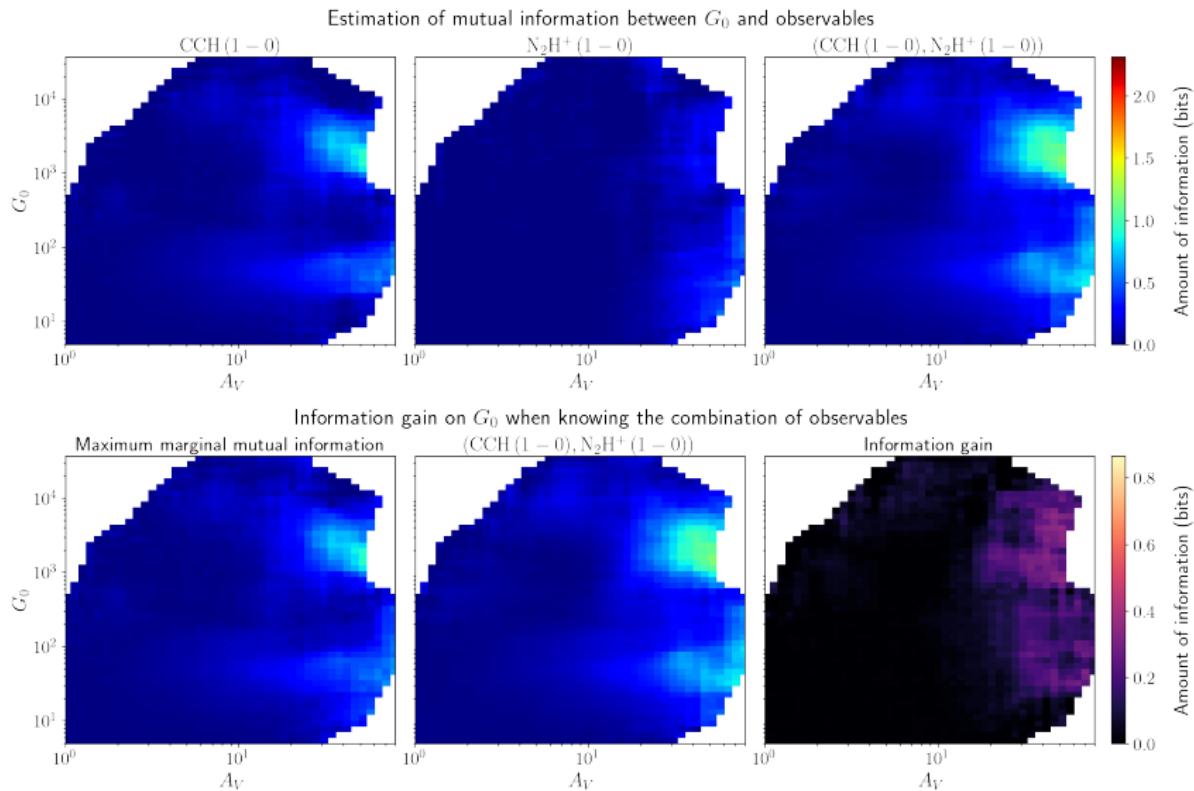
Informativity on G_0 of $(^{32}\text{SO} (2 - 1), \text{N}_2\text{H}^+ (1 - 0))$



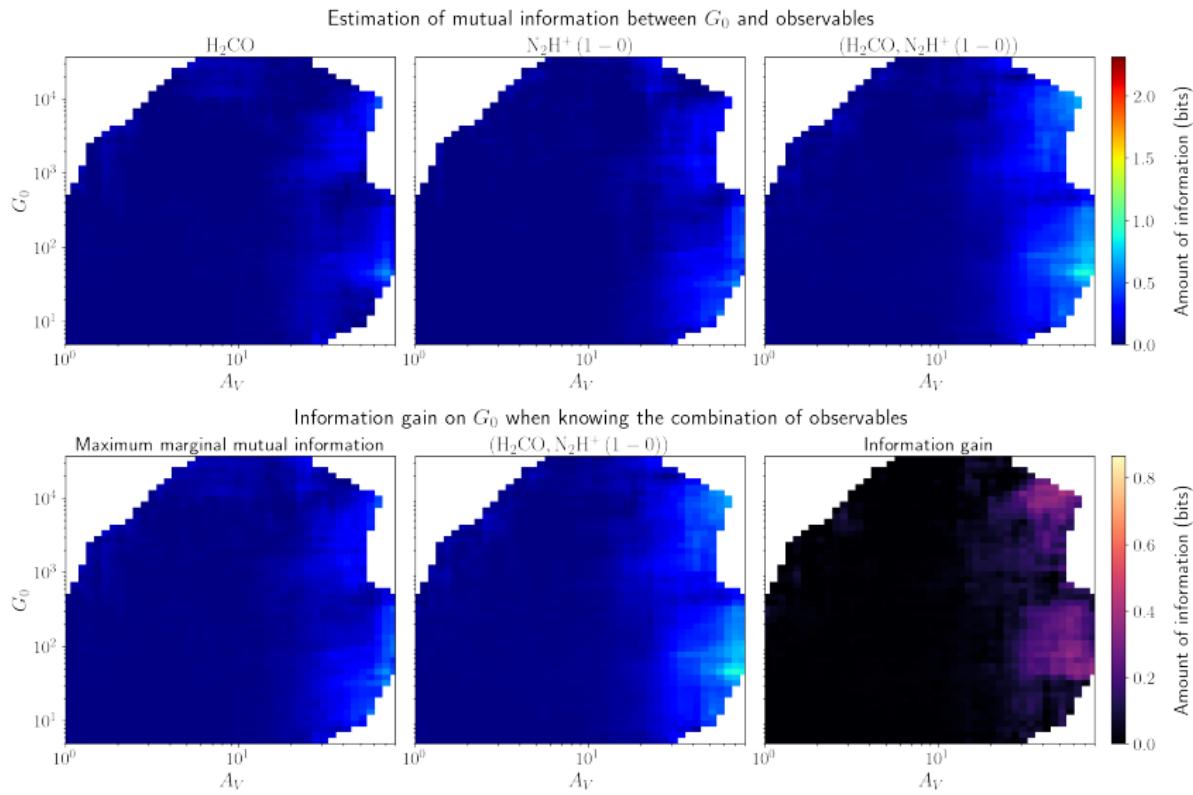
Informativity on G_0 of $(\text{C}^{18}\text{O} (1 - 0), \text{N}_2\text{H}^+ (1 - 0))$



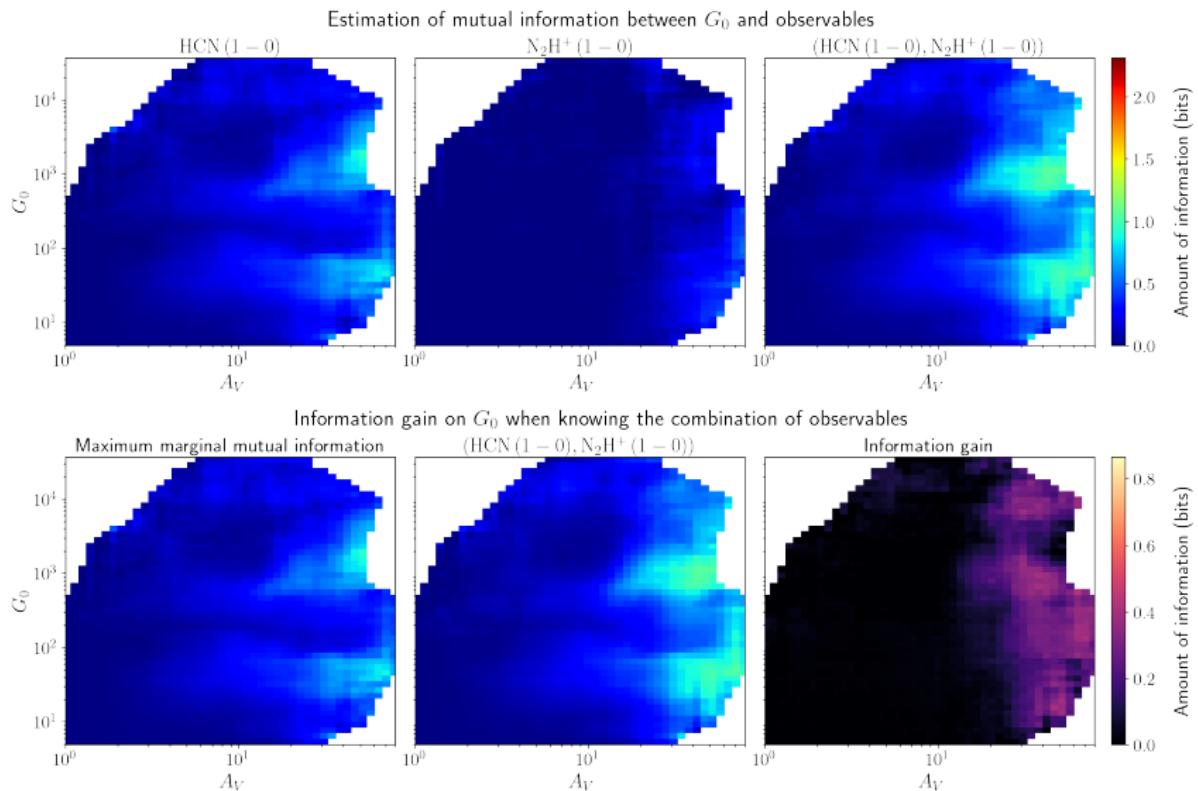
Informativity on G_0 of (CCH (1 - 0), N₂H⁺ (1 - 0))



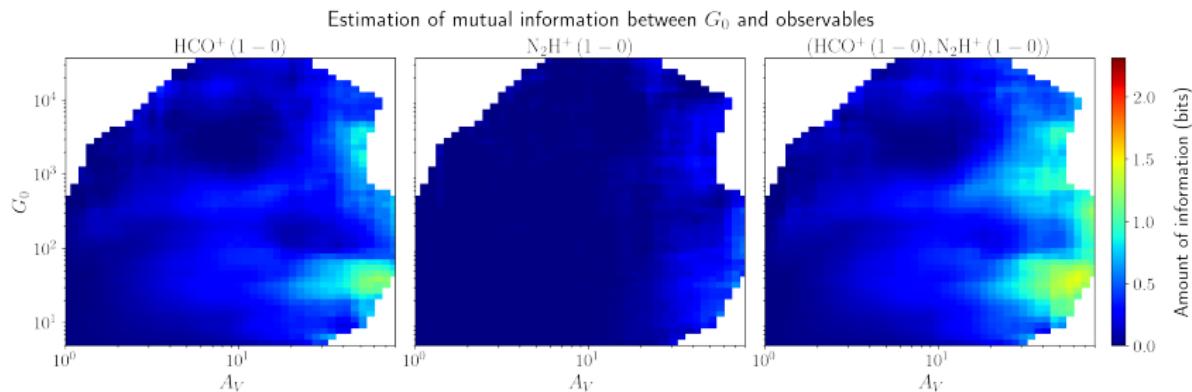
Informativity on G_0 of (H_2CO , $\text{N}_2\text{H}^+ (1 - 0)$)



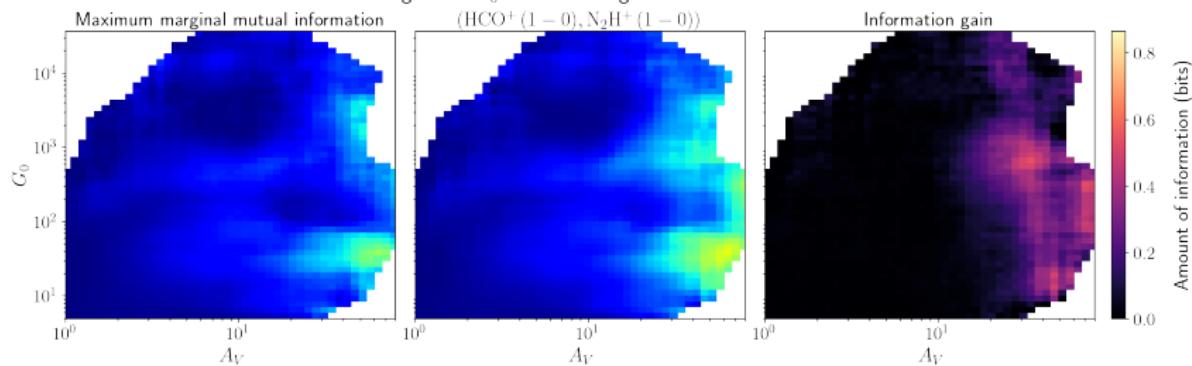
Informativity on G_0 of (HCN (1 - 0), N₂H⁺ (1 - 0))



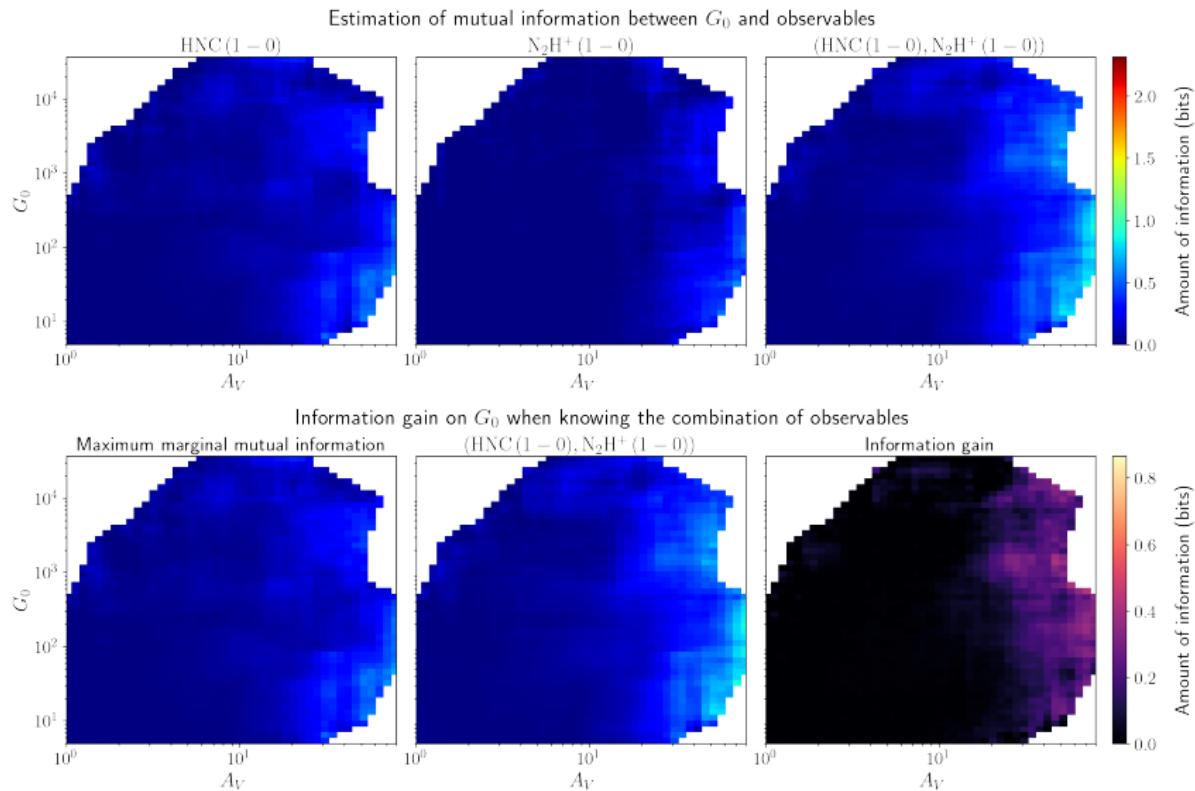
Informativity on G_0 of $(\text{HCO}^+ (1 - 0), \text{N}_2\text{H}^+ (1 - 0))$



Information gain on G_0 when knowing the combination of observables



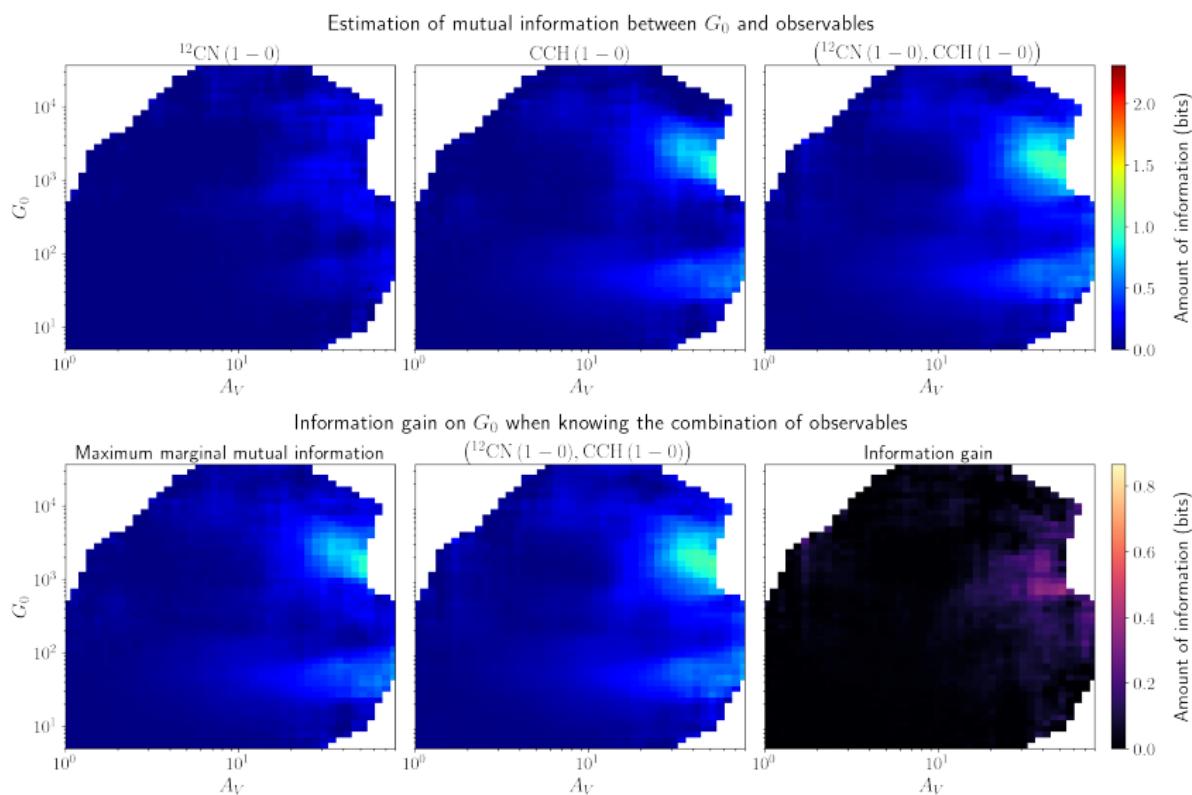
Informativity on G_0 of (HNC (1 - 0), N₂H⁺ (1 - 0))



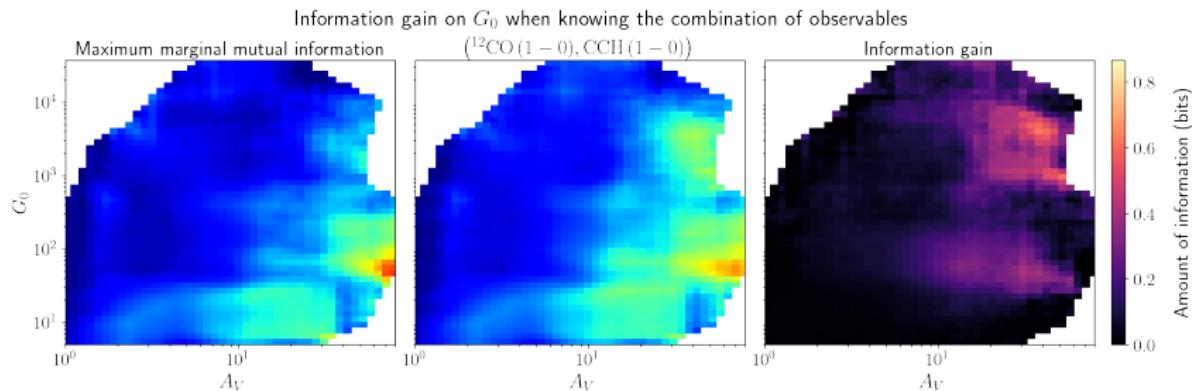
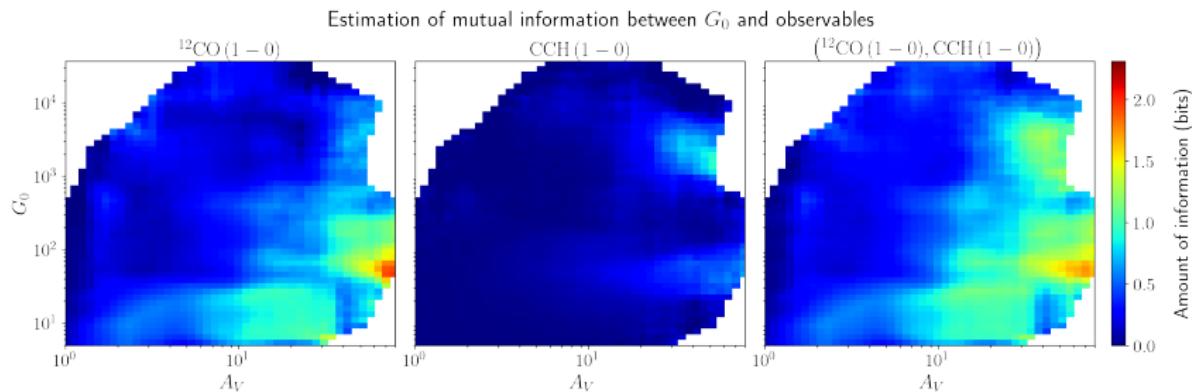
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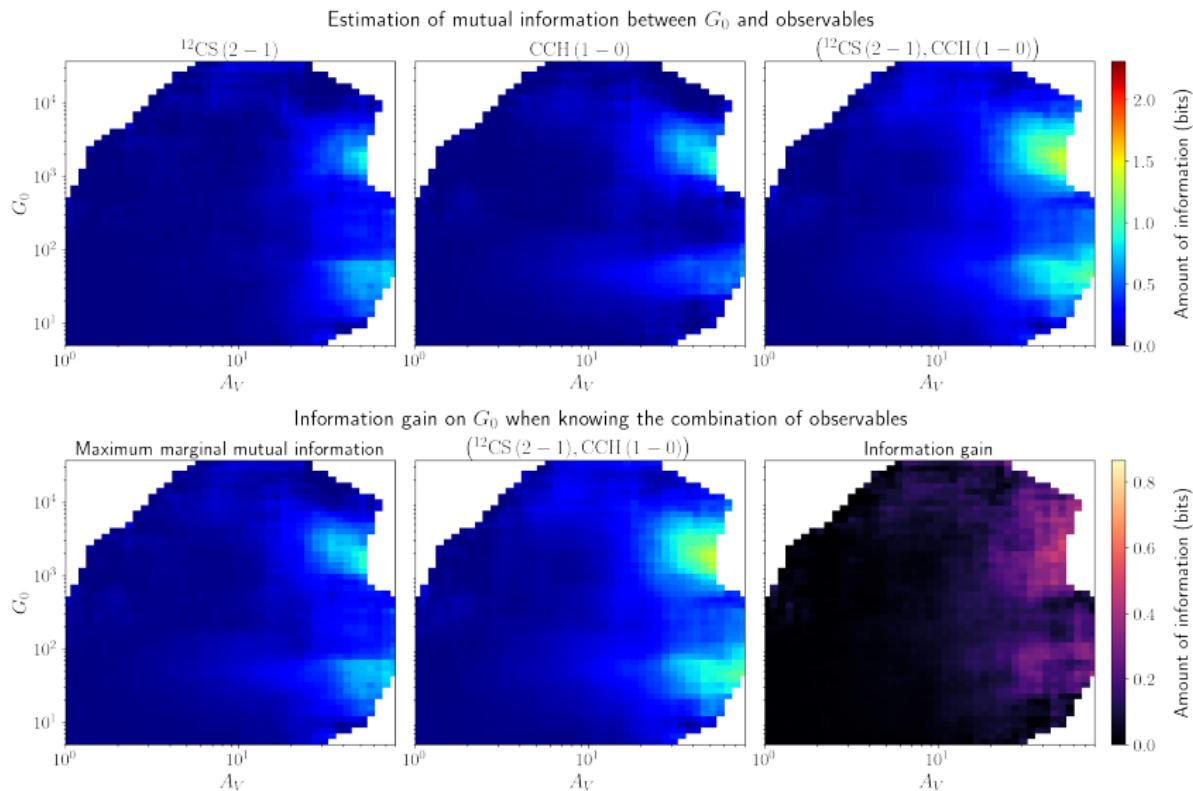
Informativity on G_0 of $(^{12}\text{CN}(1 - 0), \text{CCH}(1 - 0))$



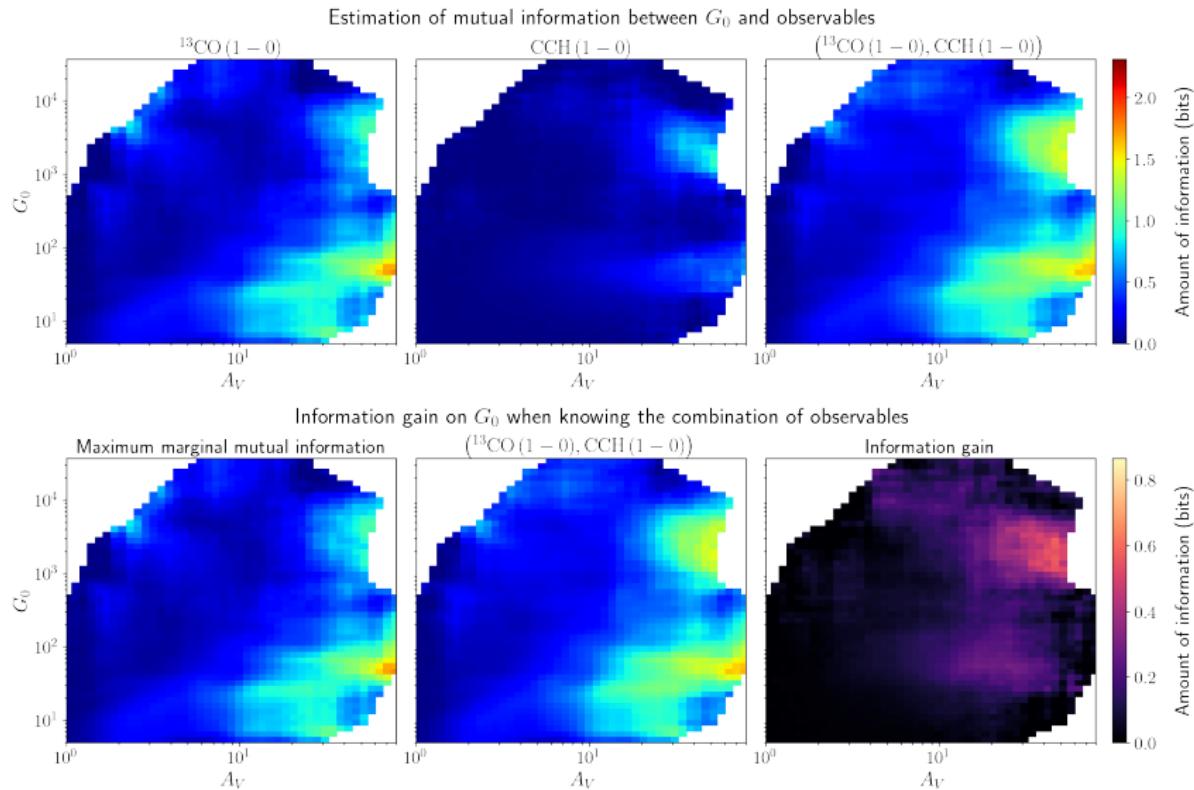
Informativity on G_0 of $(^{12}\text{CO} (1 - 0), \text{CCH} (1 - 0))$



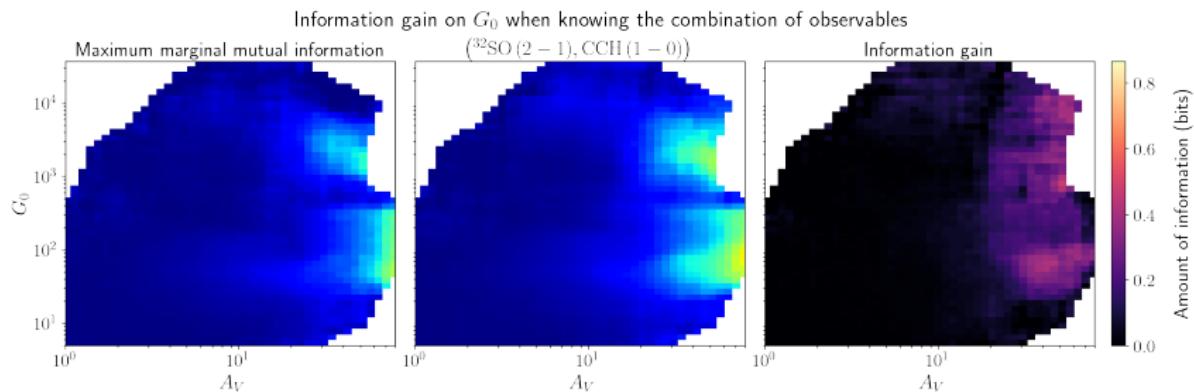
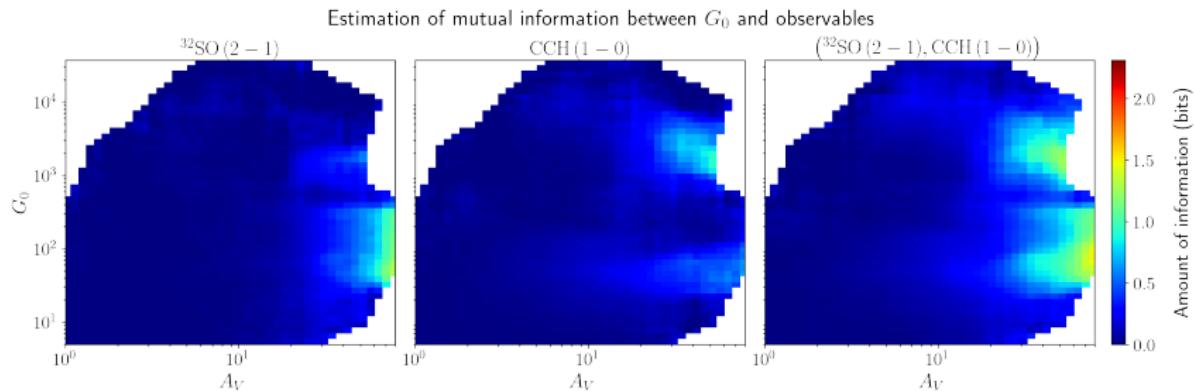
Informativity on G_0 of $(^{12}\text{CS}(2 - 1), \text{CCH}(1 - 0))$



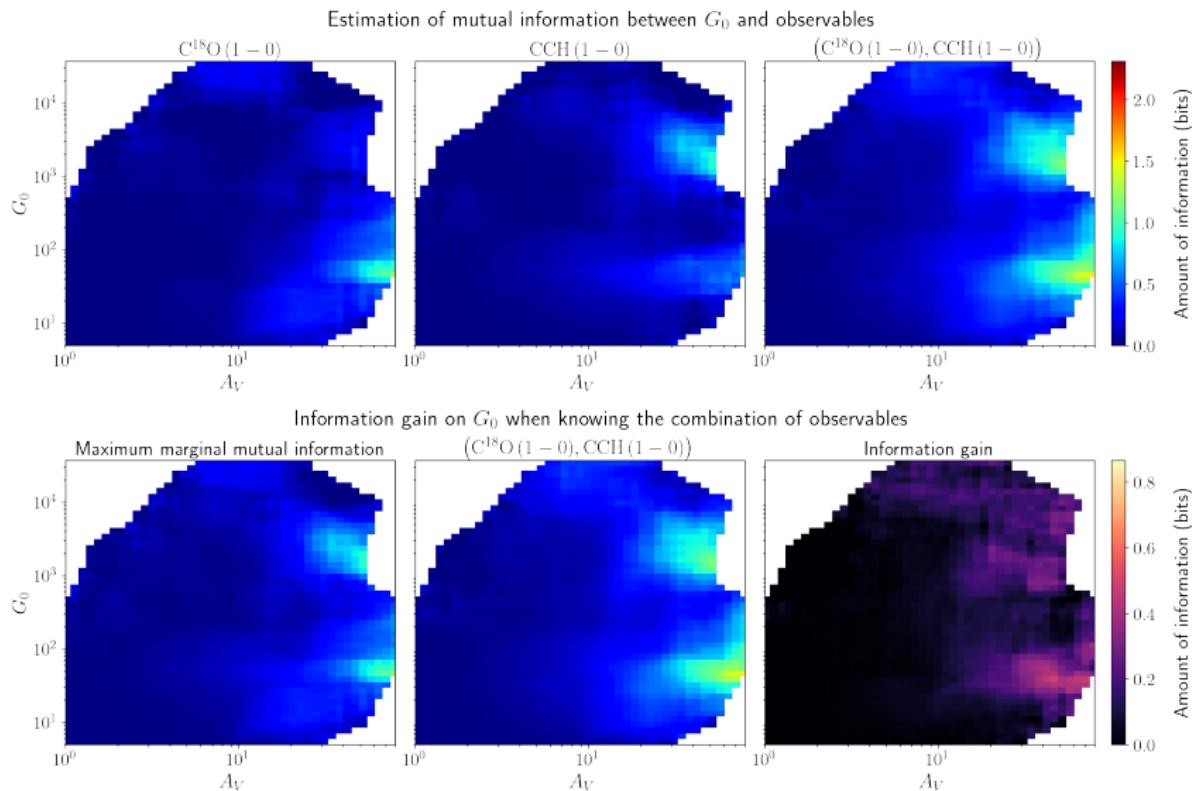
Informativity on G_0 of $(^{13}\text{CO}(1 - 0), \text{CCH}(1 - 0))$



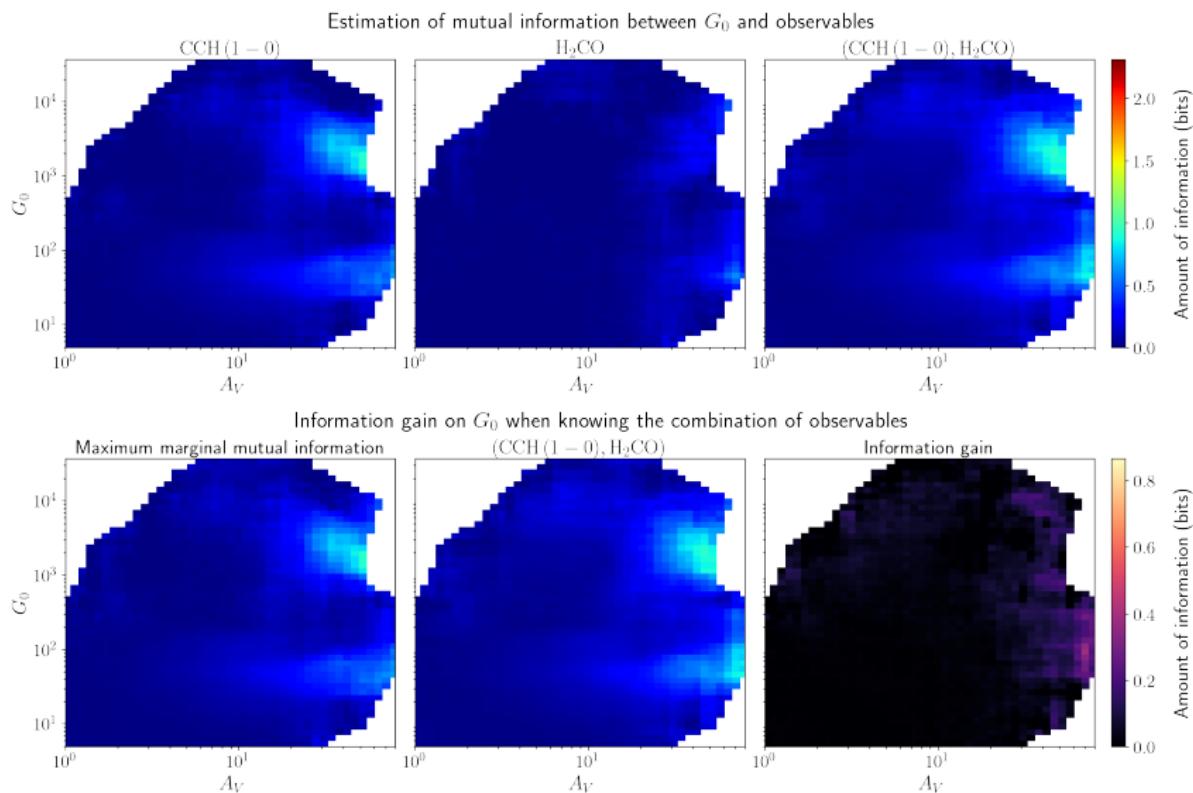
Informativity on G_0 of $(^{32}\text{SO} (2 - 1), \text{CCH} (1 - 0))$



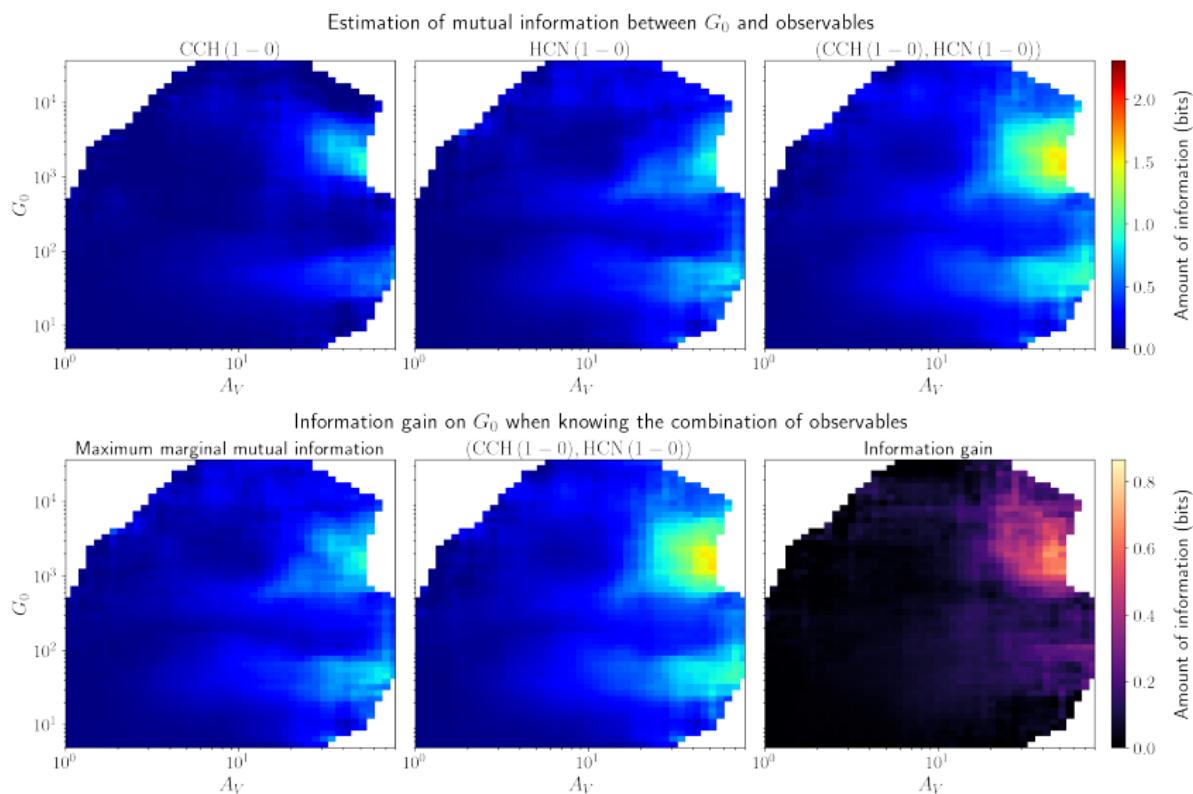
Informativity on G_0 of $(\text{C}^{18}\text{O} (1 - 0), \text{CCH} (1 - 0))$



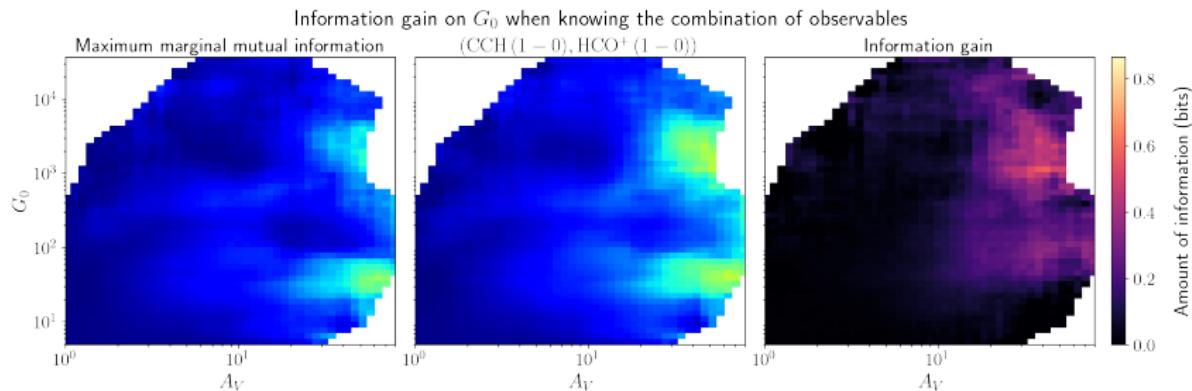
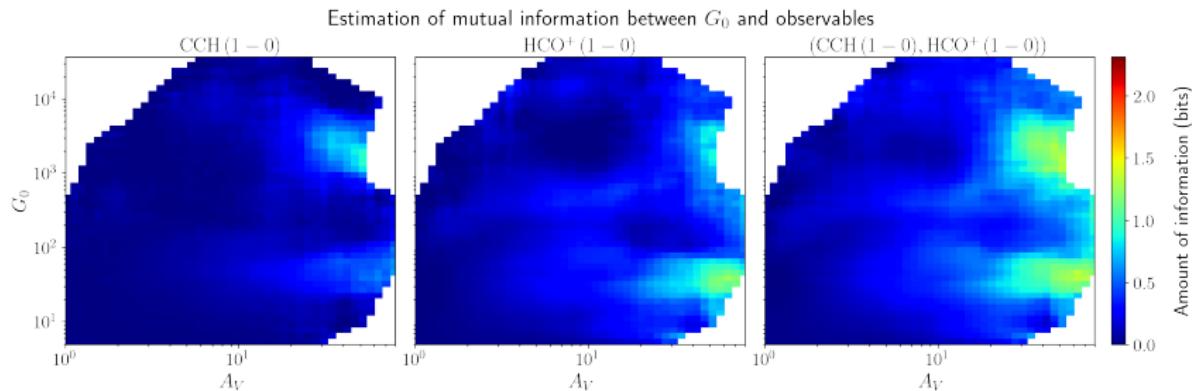
Informativity on G_0 of (CCH (1 – 0), H₂CO)



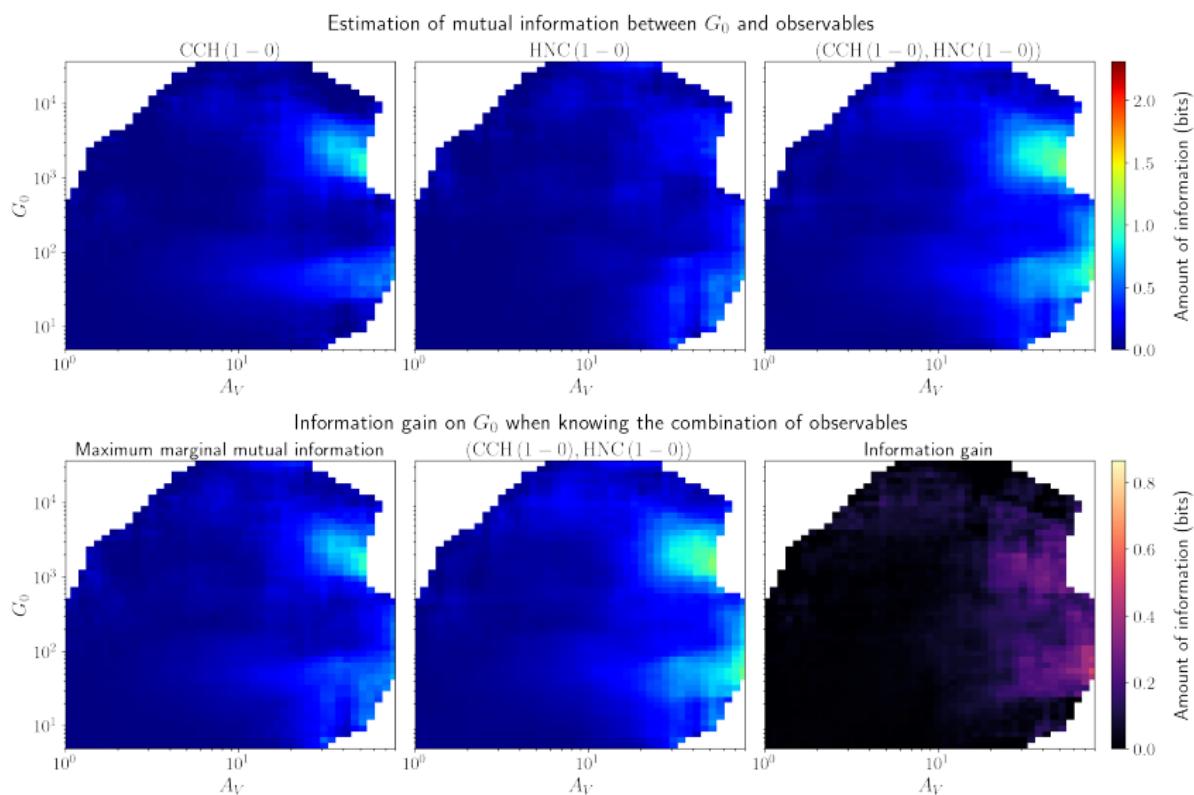
Informativity on G_0 of (CCH (1 - 0), HCN (1 - 0))



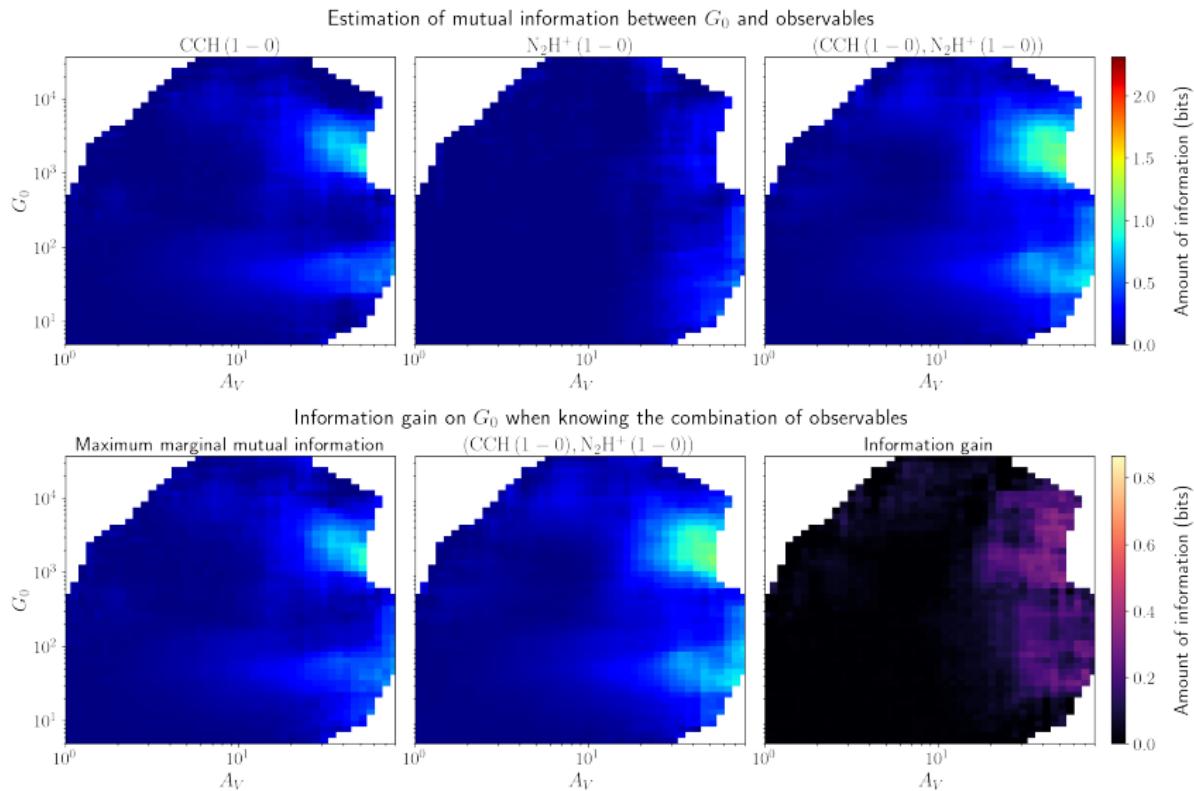
Informativity on G_0 of (CCH (1 - 0), HCO⁺ (1 - 0))



Informativity on G_0 of (CCH(1 - 0), HNC(1 - 0))



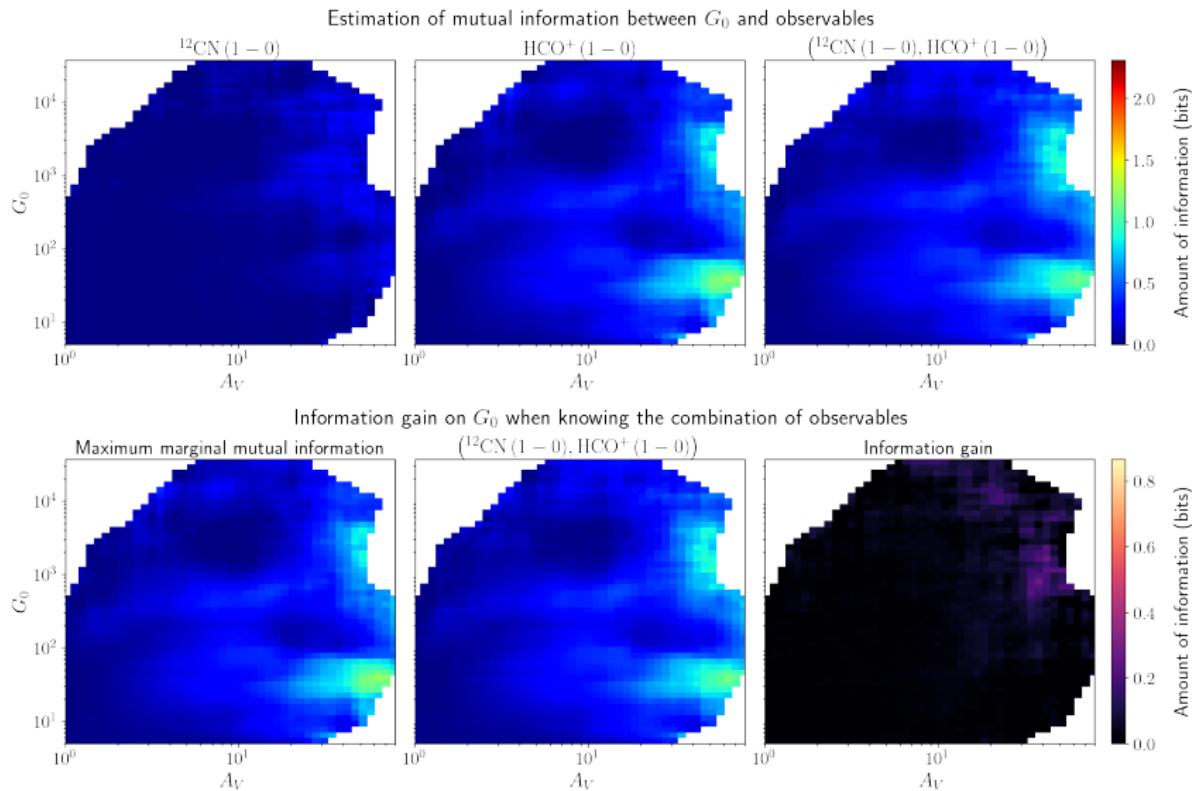
Informativity on G_0 of (CCH (1 - 0), N₂H⁺ (1 - 0))



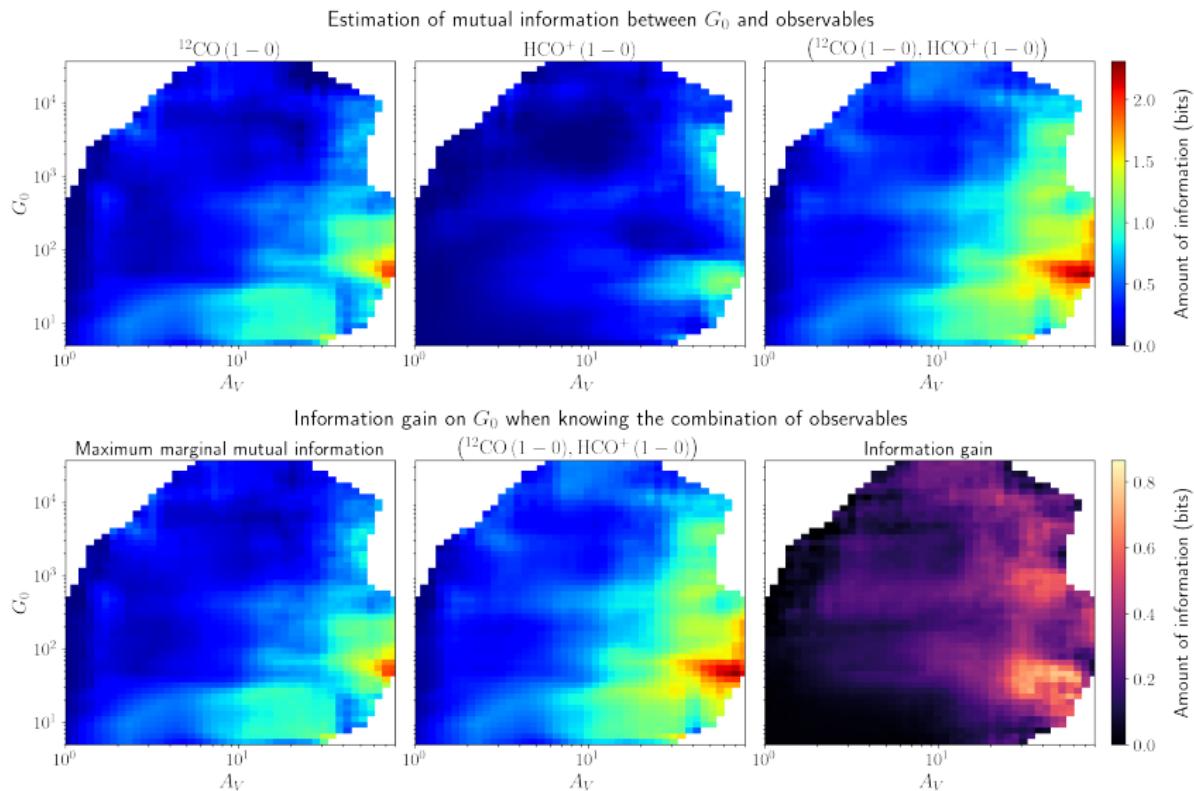
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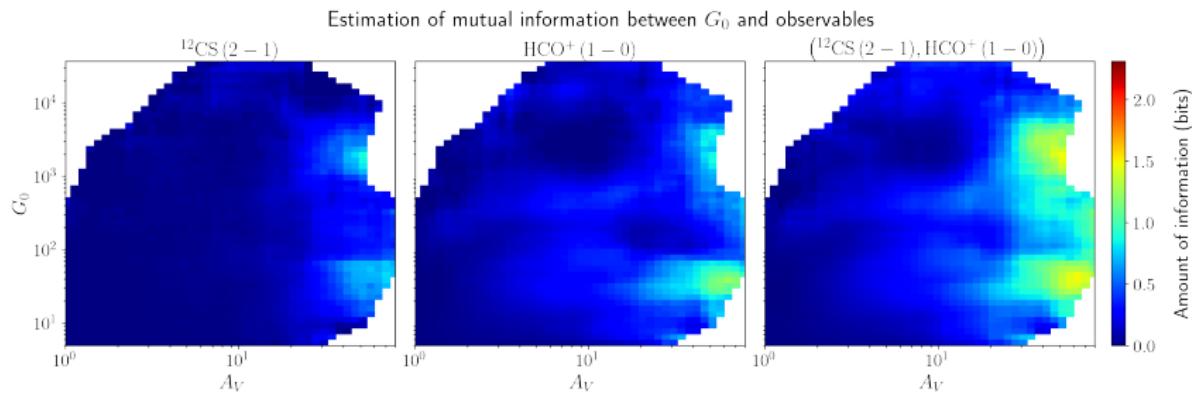
Informativity on G_0 of $(^{12}\text{CN}(1 - 0), \text{HCO}^+(1 - 0))$



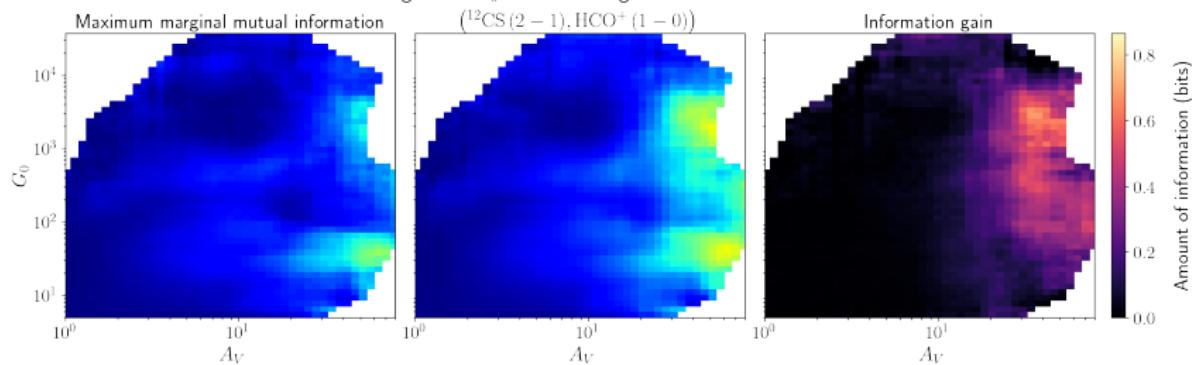
Informativity on G_0 of $(^{12}\text{CO} (1 - 0), \text{HCO}^+ (1 - 0))$



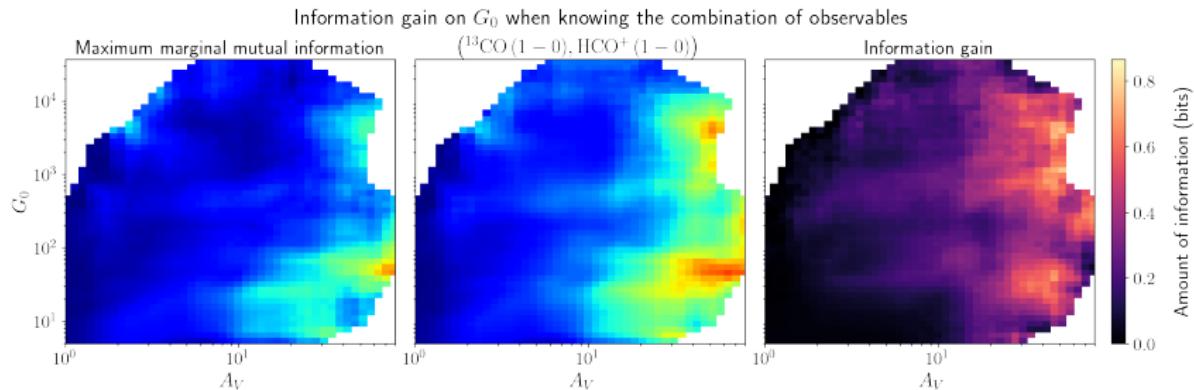
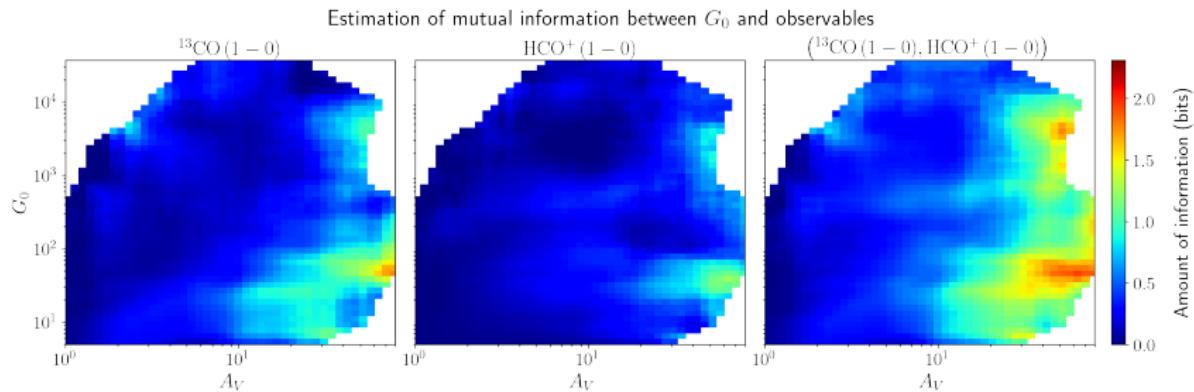
Informativity on G_0 of $(^{12}\text{CS}(2 - 1), \text{HCO}^+(1 - 0))$



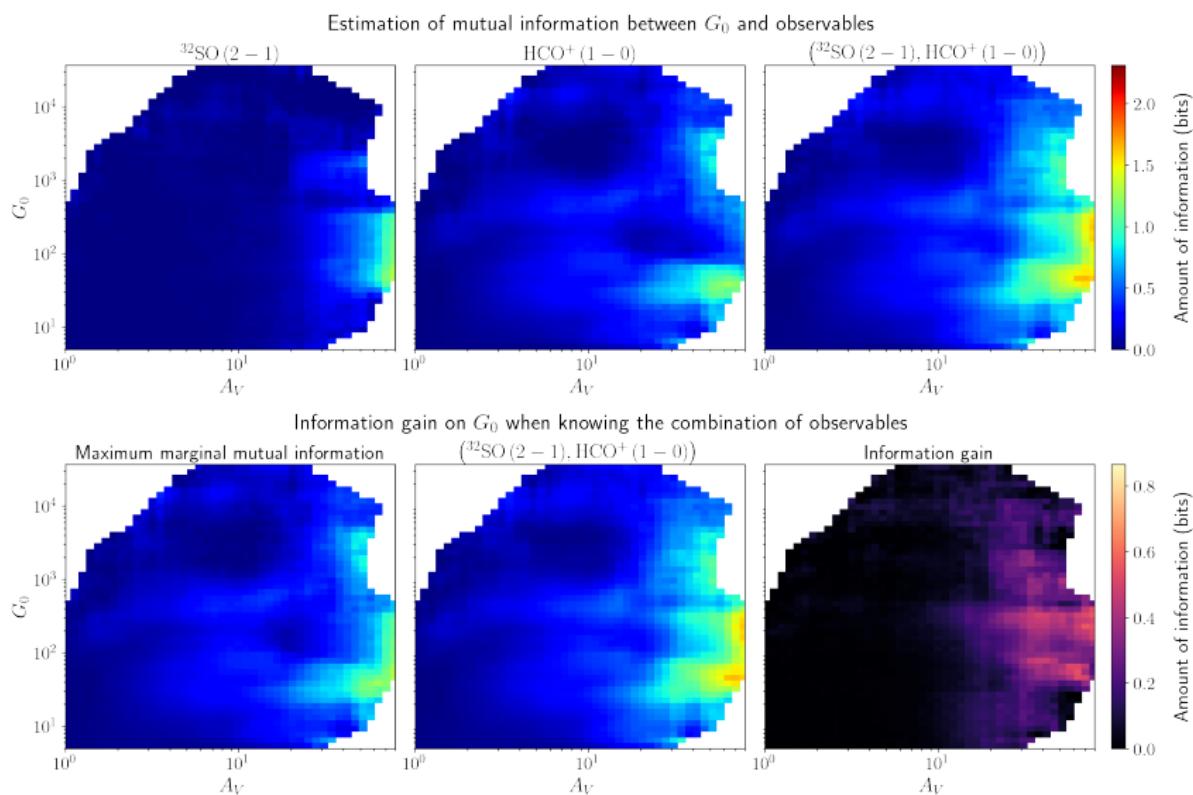
Information gain on G_0 when knowing the combination of observables



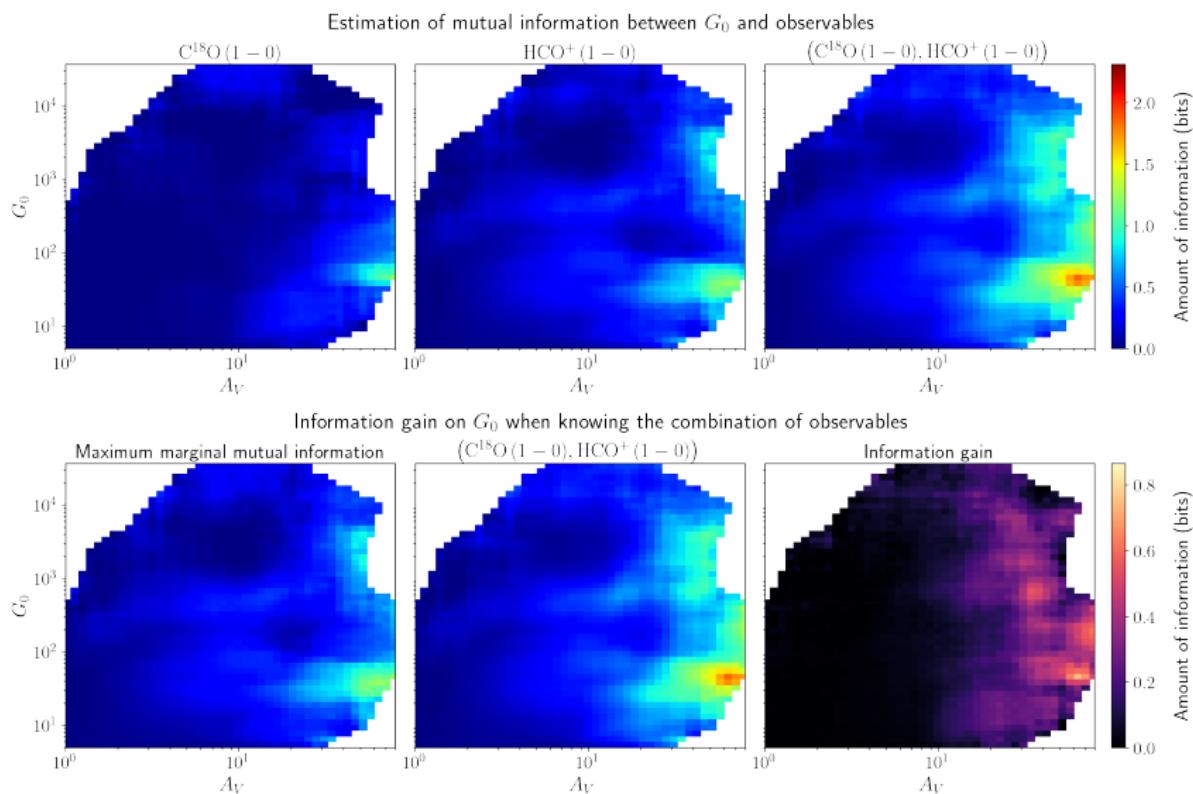
Informativity on G_0 of $(^{13}\text{CO} (1 - 0), \text{HCO}^+ (1 - 0))$



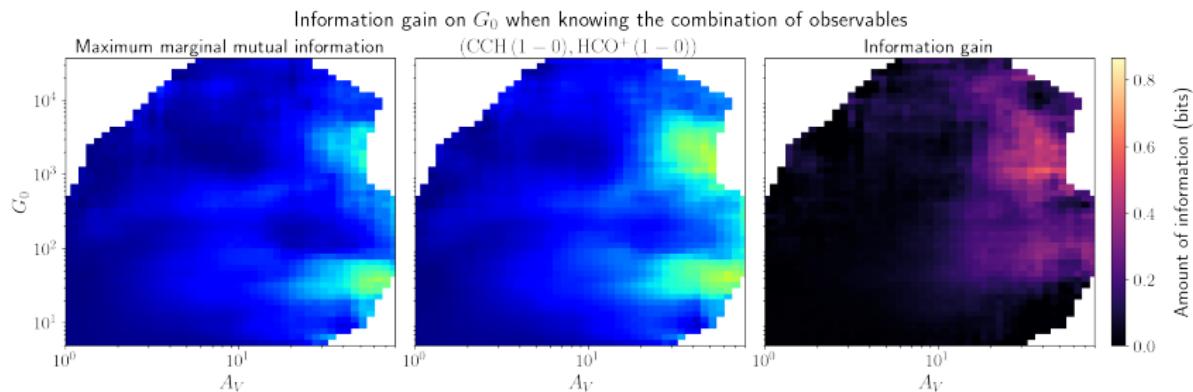
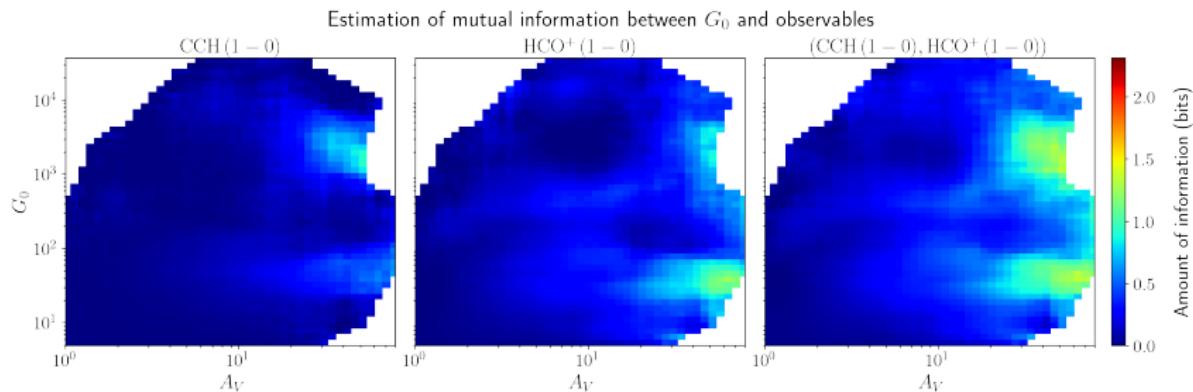
Informativity on G_0 of $(^{32}\text{SO} (2 - 1), \text{HCO}^+ (1 - 0))$



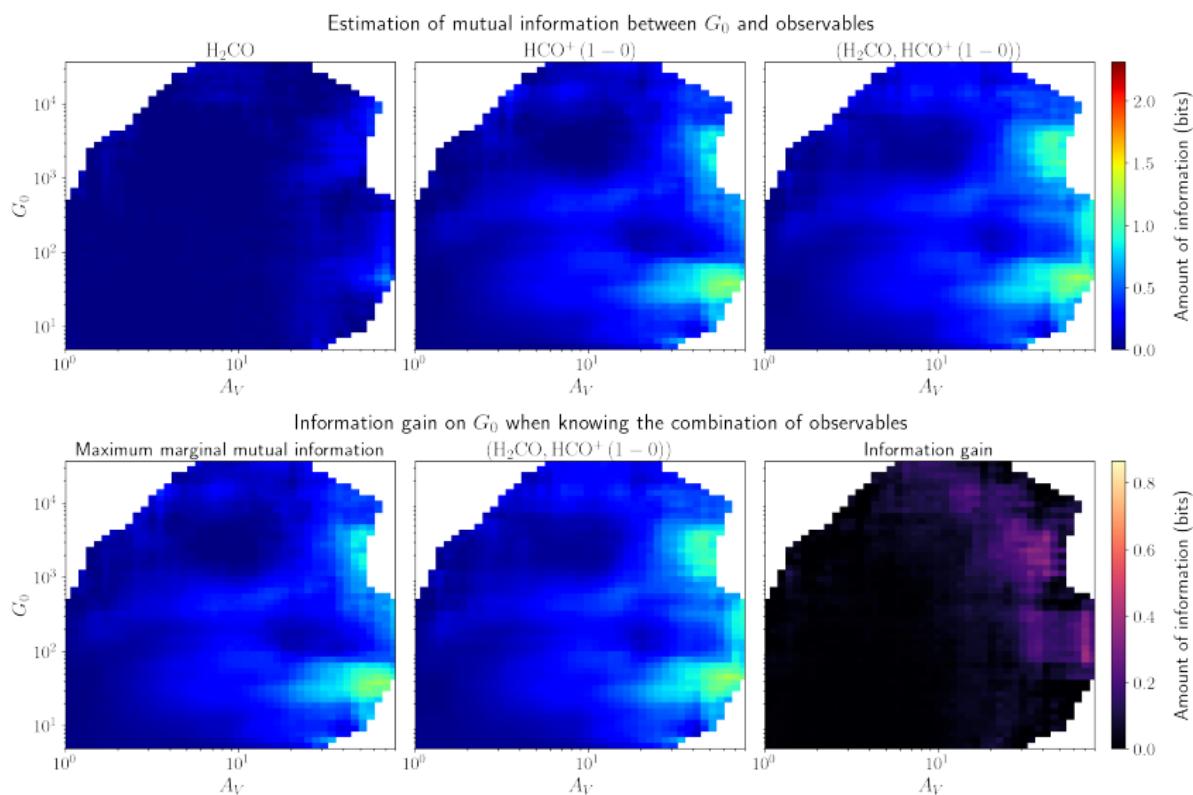
Informativity on G_0 of $(\text{C}^{18}\text{O} (1 - 0), \text{HCO}^+ (1 - 0))$



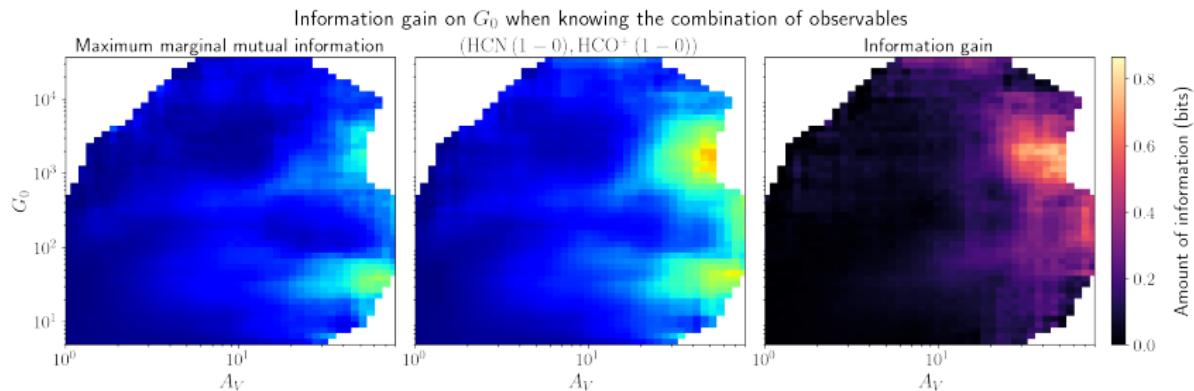
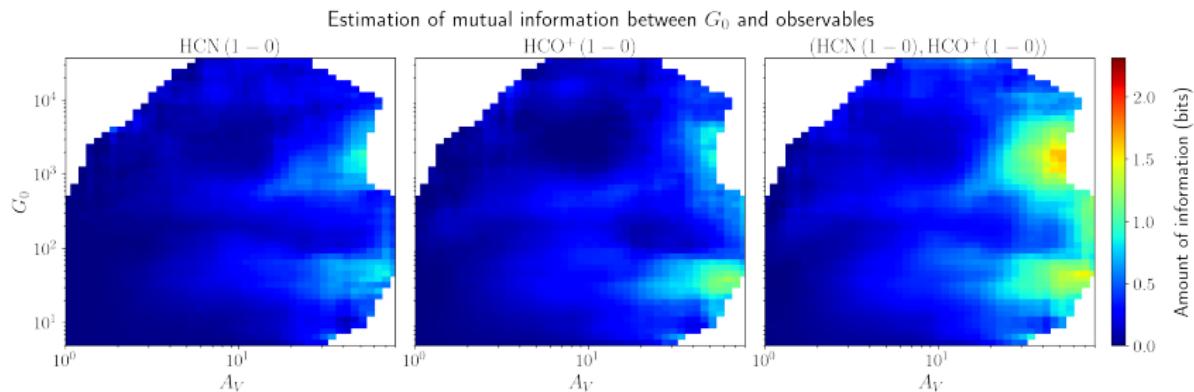
Informativity on G_0 of (CCH (1 - 0), HCO⁺ (1 - 0))



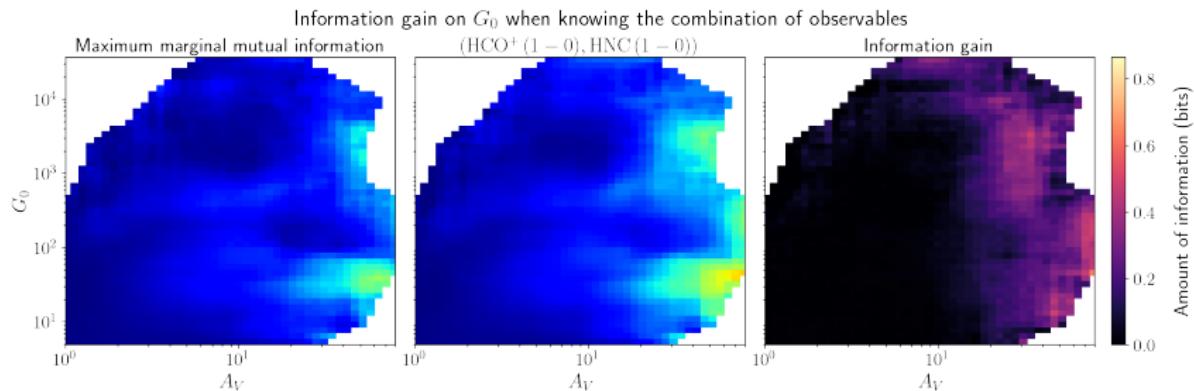
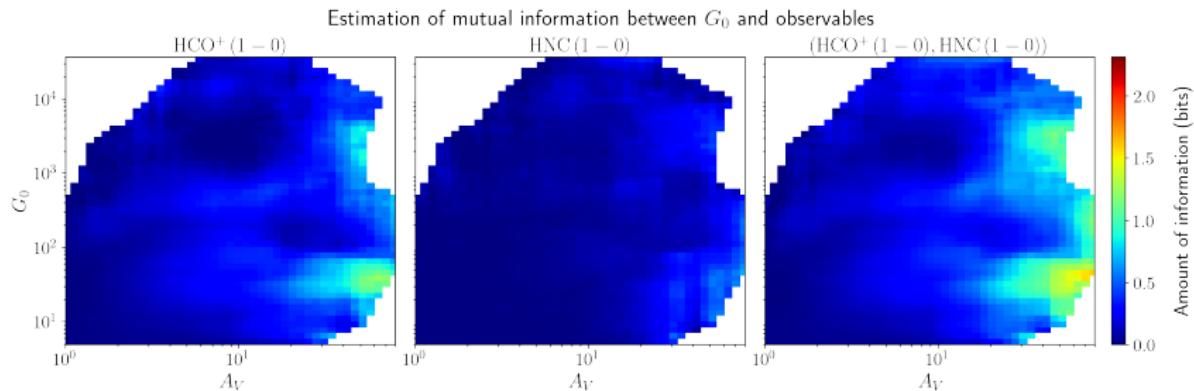
Informativity on G_0 of (H_2CO , $\text{HCO}^+ (1 - 0)$)



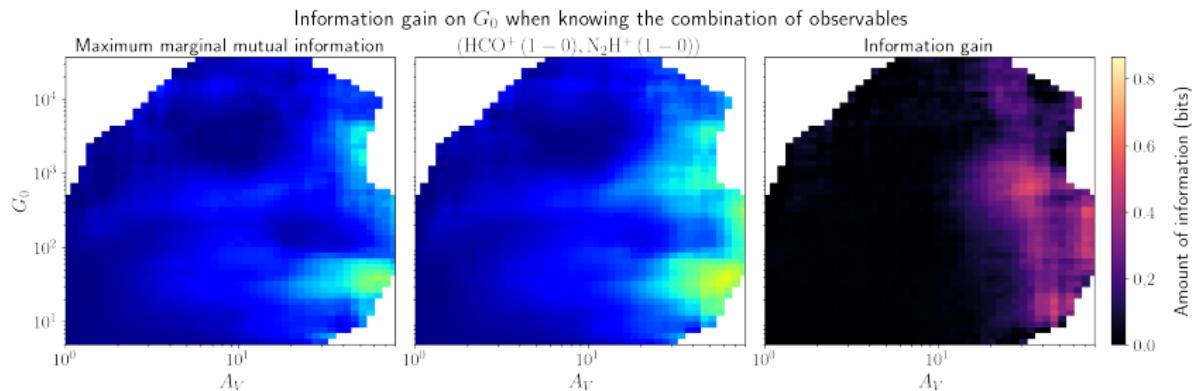
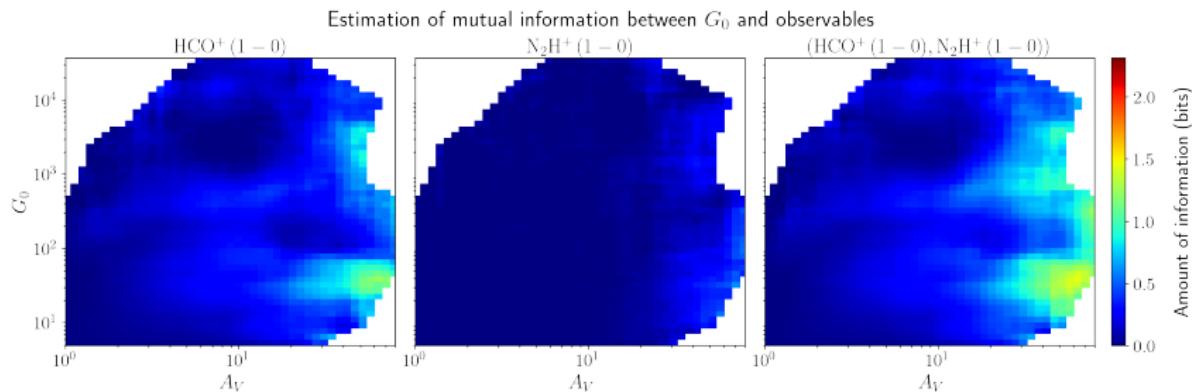
Informativity on G_0 of (HCN (1 – 0), HCO⁺ (1 – 0))



Informativity on G_0 of ($\text{HCO}^+ (1 - 0)$, $\text{HNC} (1 - 0)$)



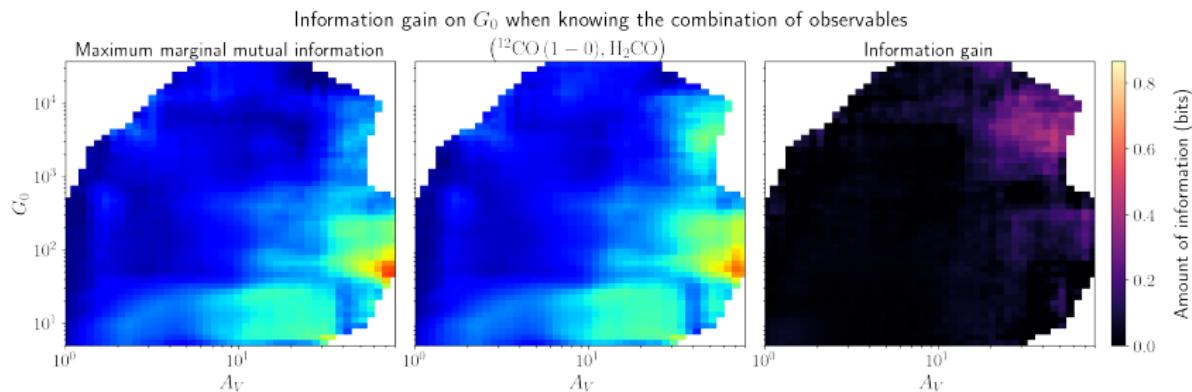
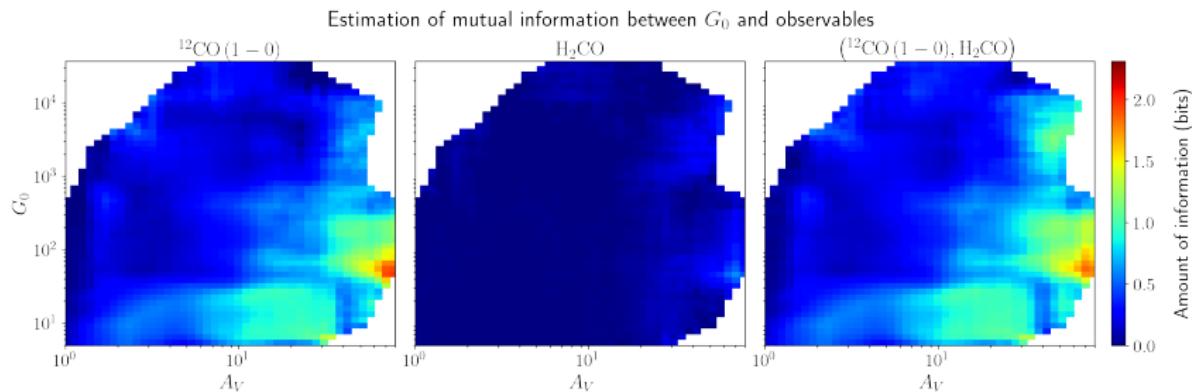
Informativity on G_0 of $(\text{HCO}^+ (1 - 0), \text{N}_2\text{H}^+ (1 - 0))$



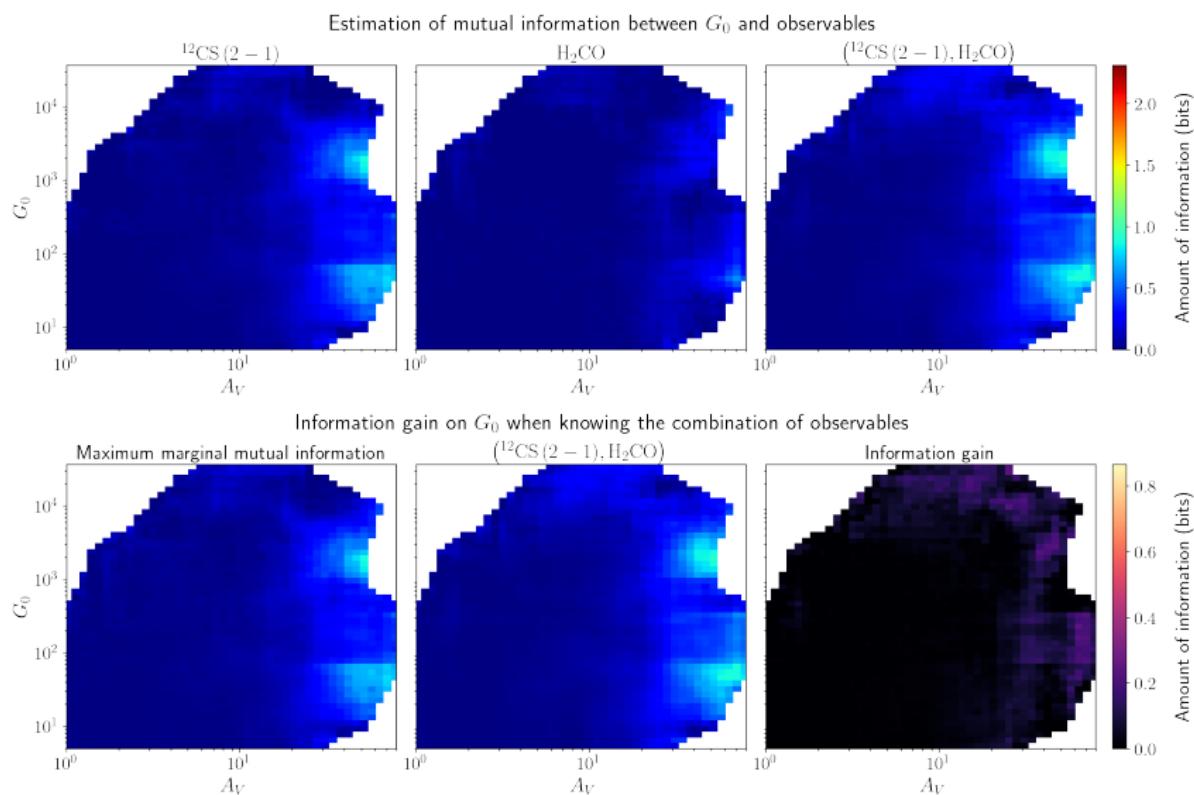
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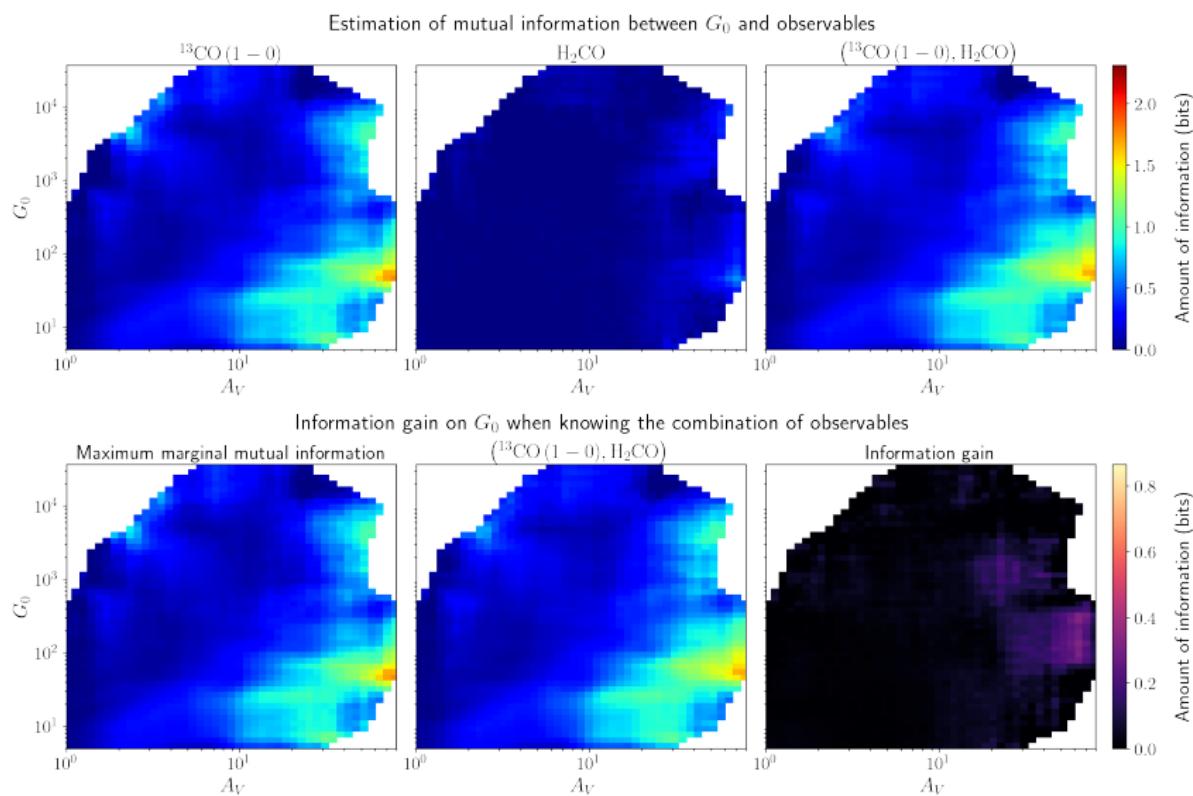
Informativity on G_0 of $(^{12}\text{CO} (1 - 0), \text{H}_2\text{CO})$



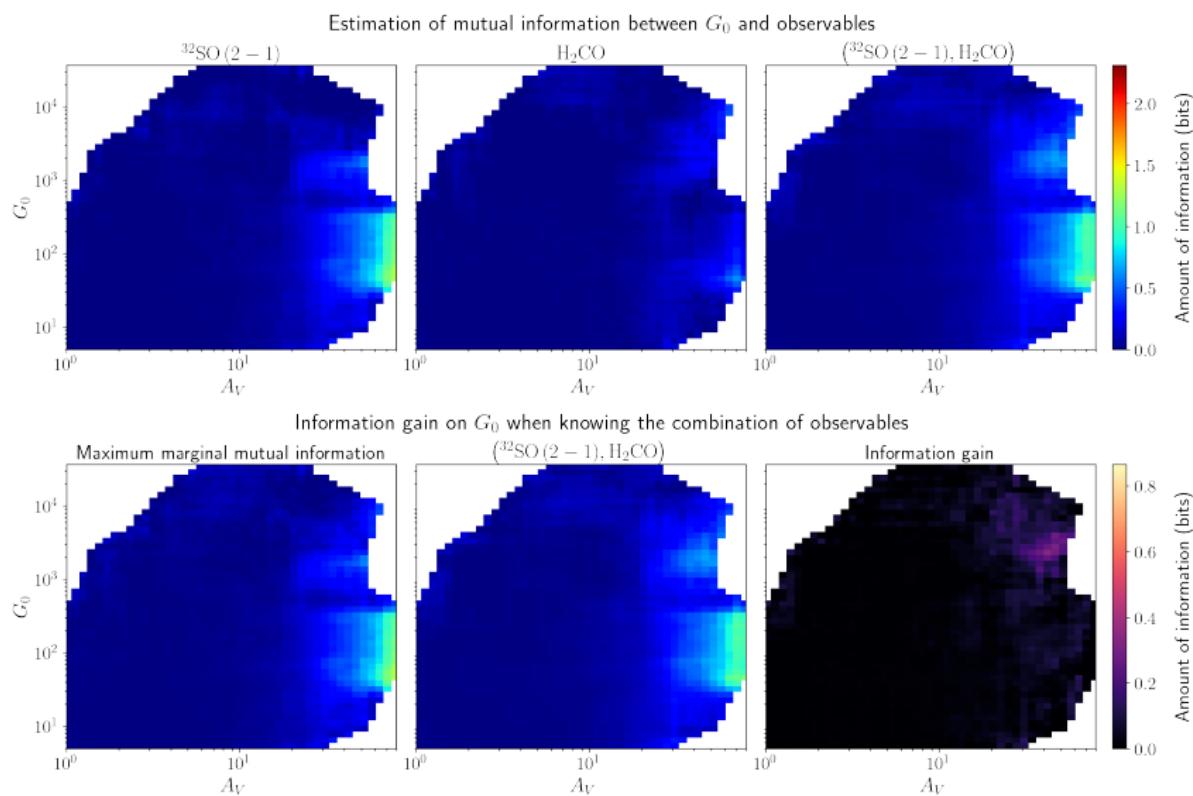
Informativity on G_0 of $(^{12}\text{CS}(2 - 1), \text{H}_2\text{CO})$



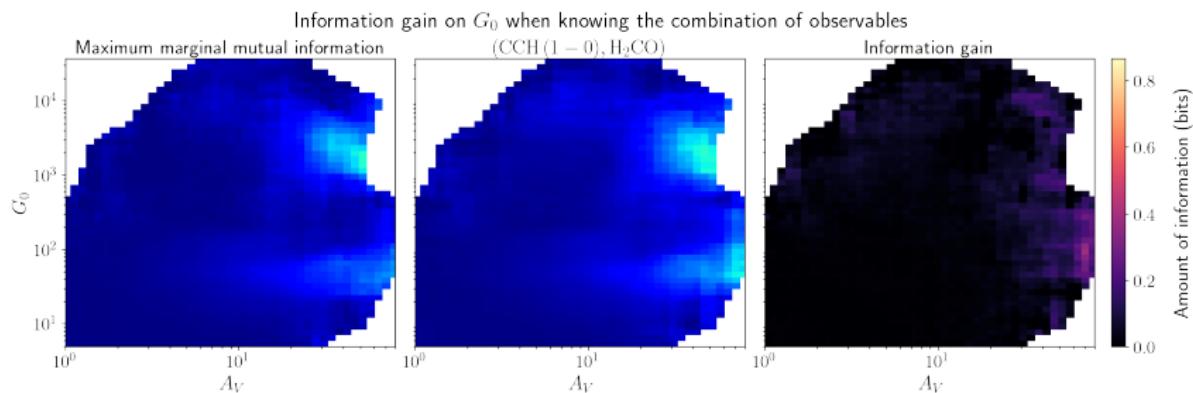
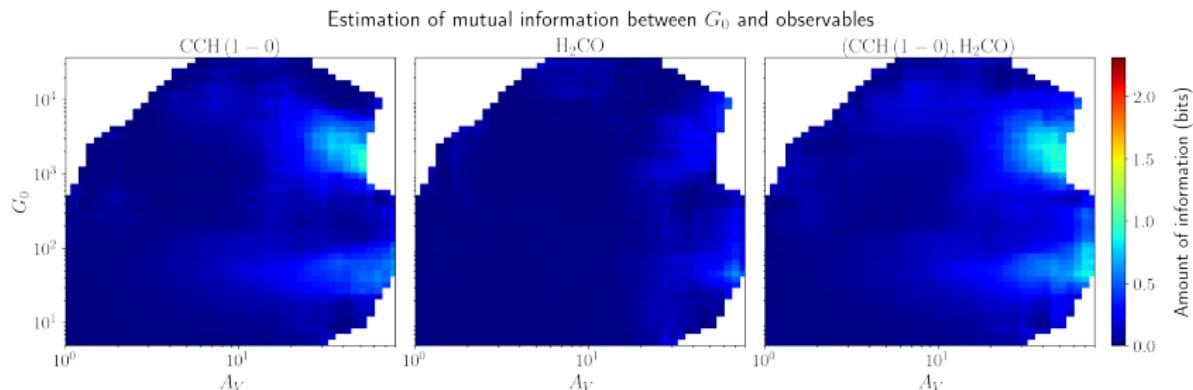
Informativity on G_0 of $(^{13}\text{CO} (1 - 0), \text{H}_2\text{CO})$



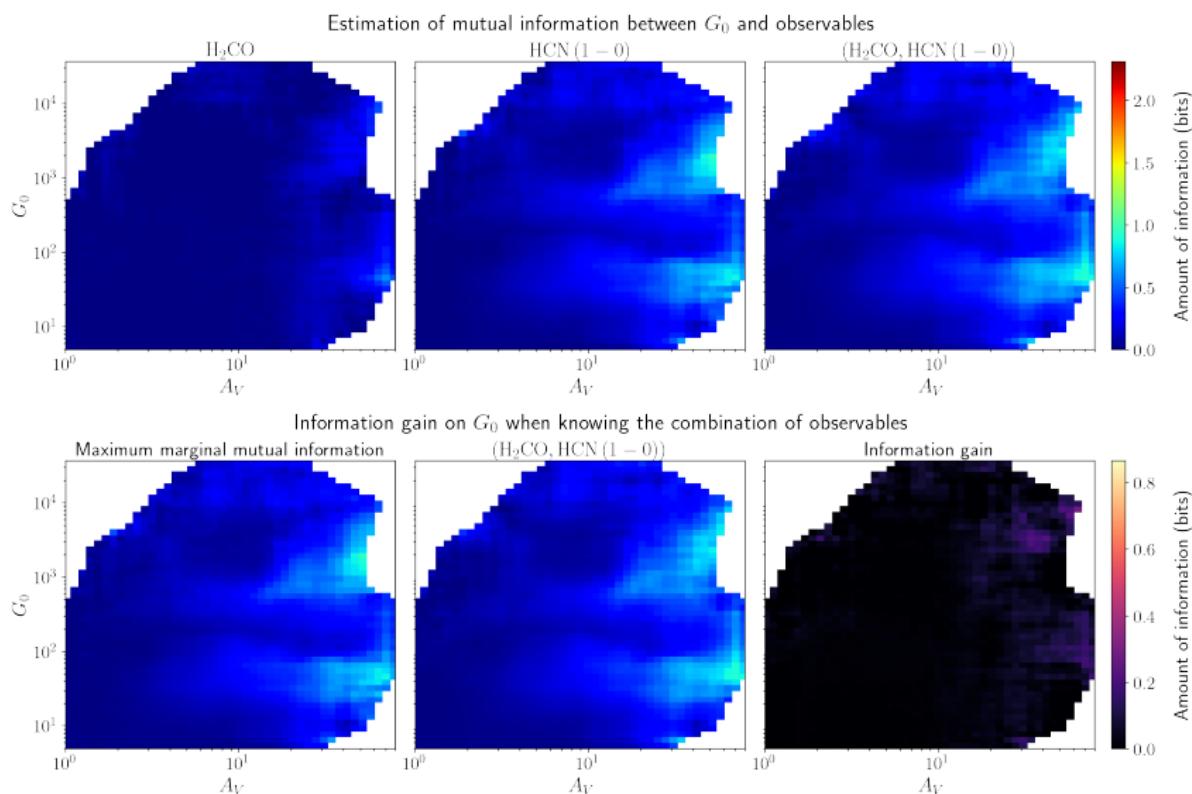
Informativity on G_0 of $(^{32}\text{SO} (2 - 1), \text{H}_2\text{CO})$



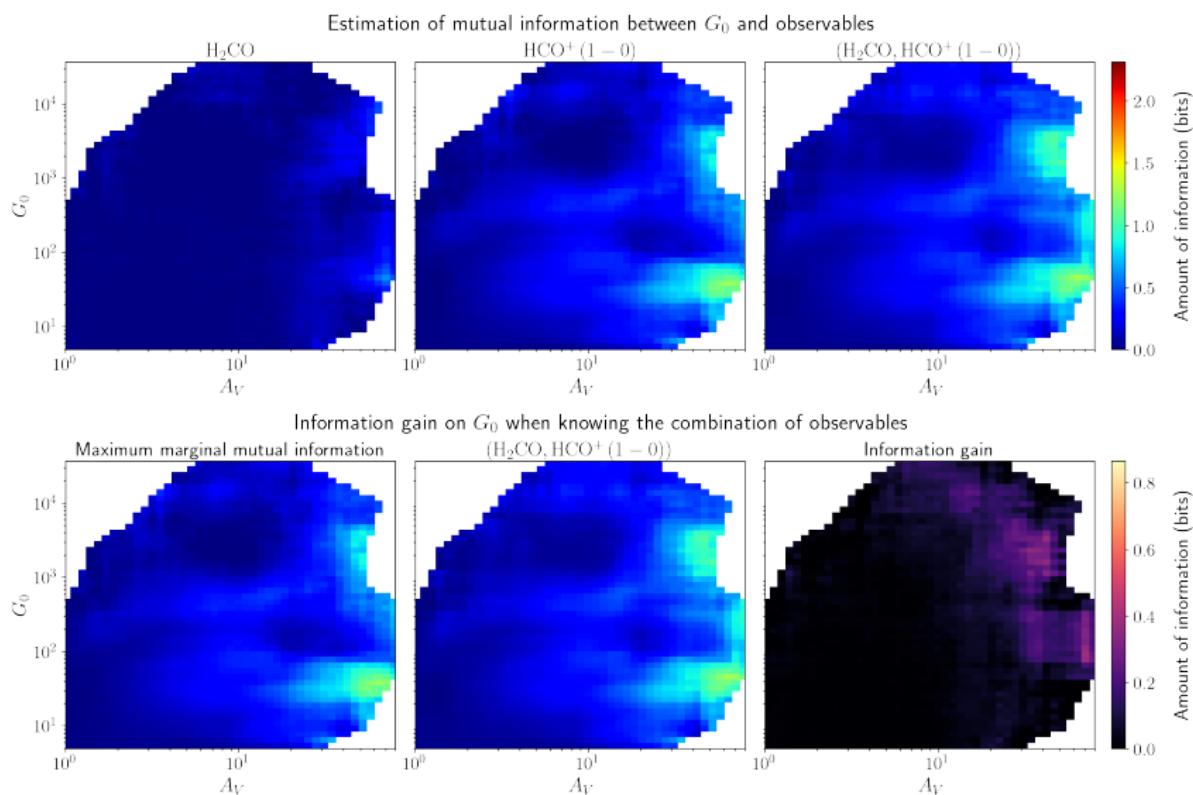
Informativity on G_0 of (CCH (1 – 0), H₂CO)



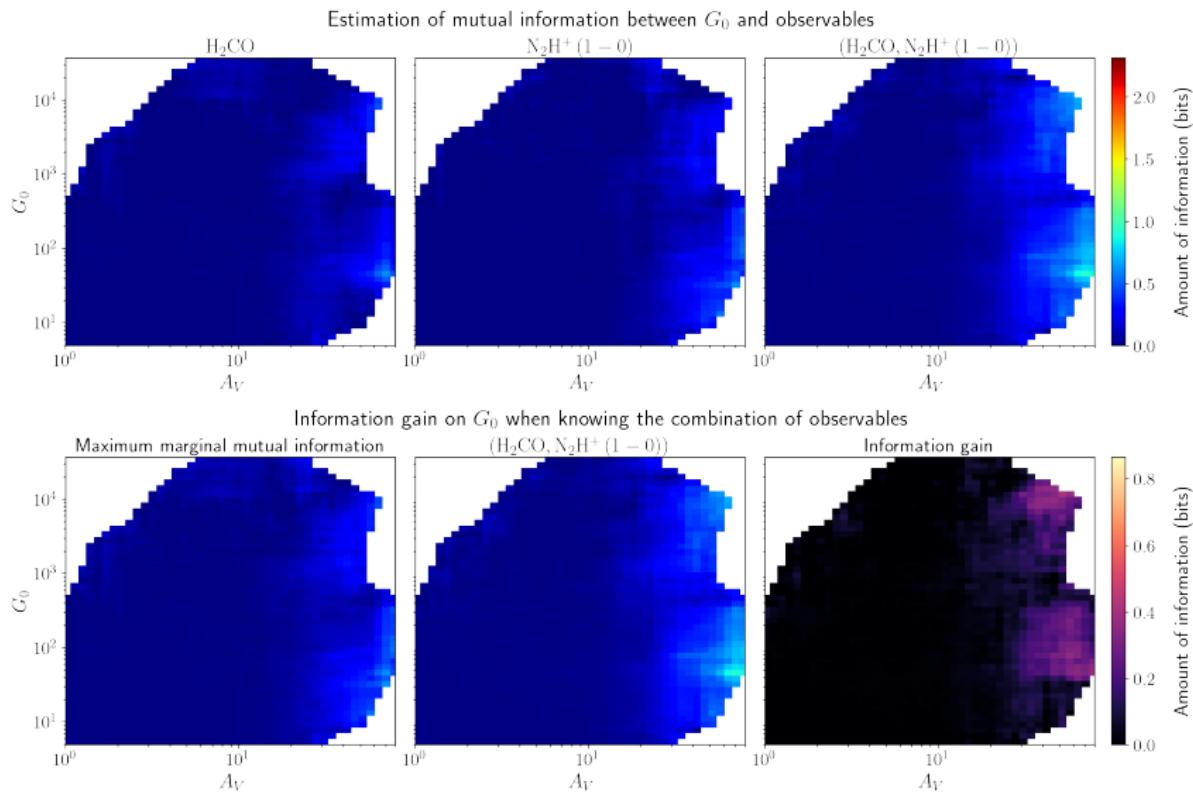
Informativity on G_0 of (H_2CO , $\text{HCN} (1 - 0)$)



Informativity on G_0 of (H_2CO , $\text{HCO}^+ (1 - 0)$)



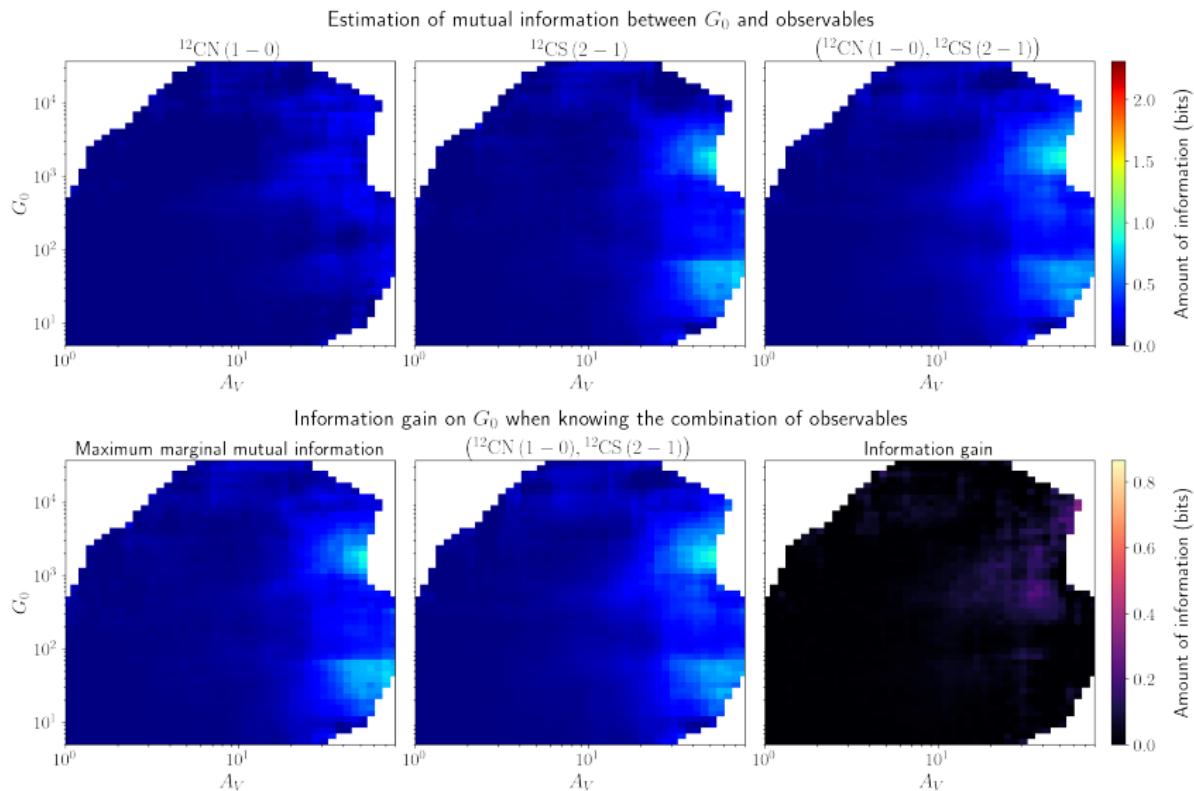
Informativity on G_0 of (H_2CO , $\text{N}_2\text{H}^+ (1 - 0)$)



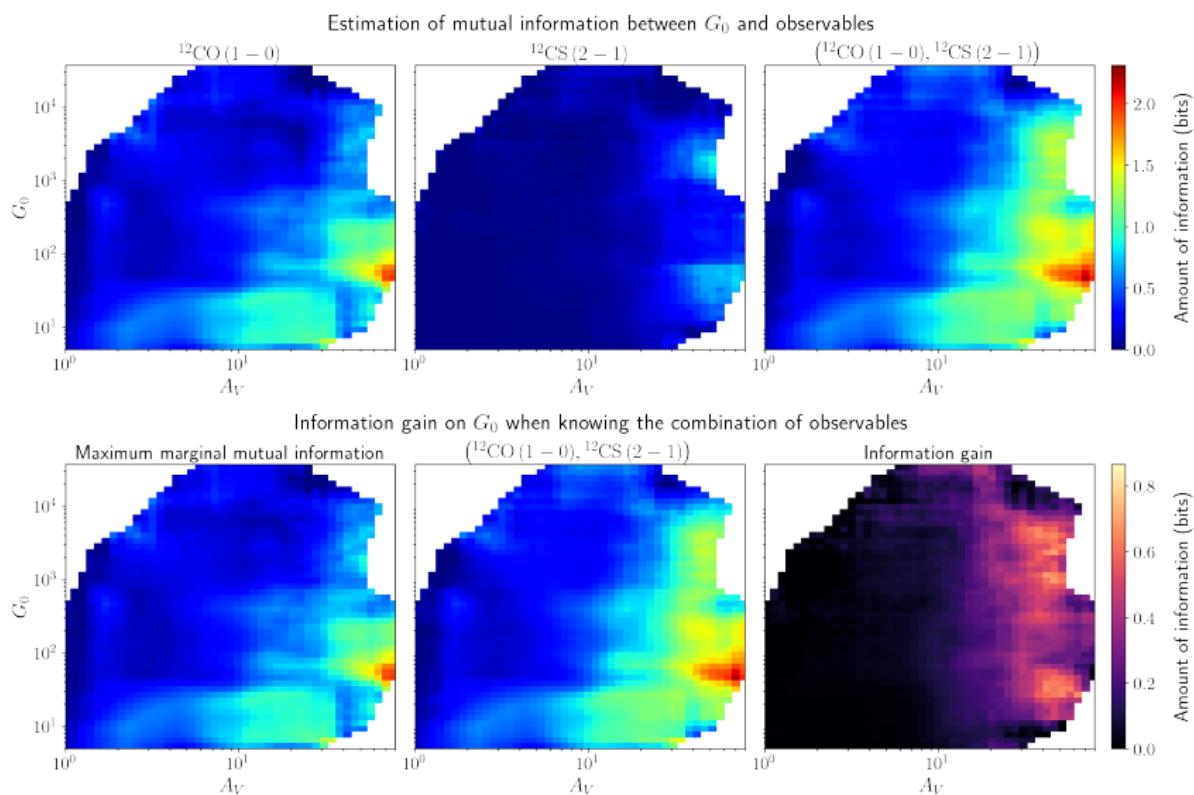
Outline

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- 12 Combinations including HNC (1 – 0) (8 available)**

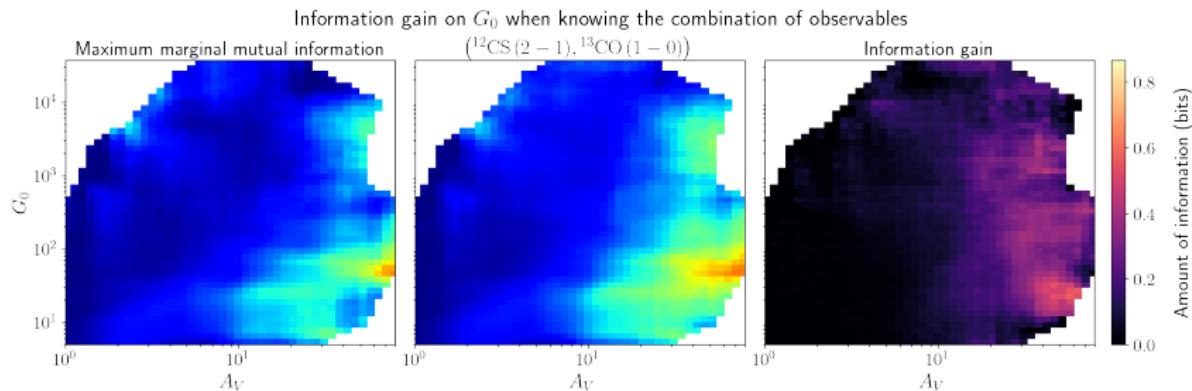
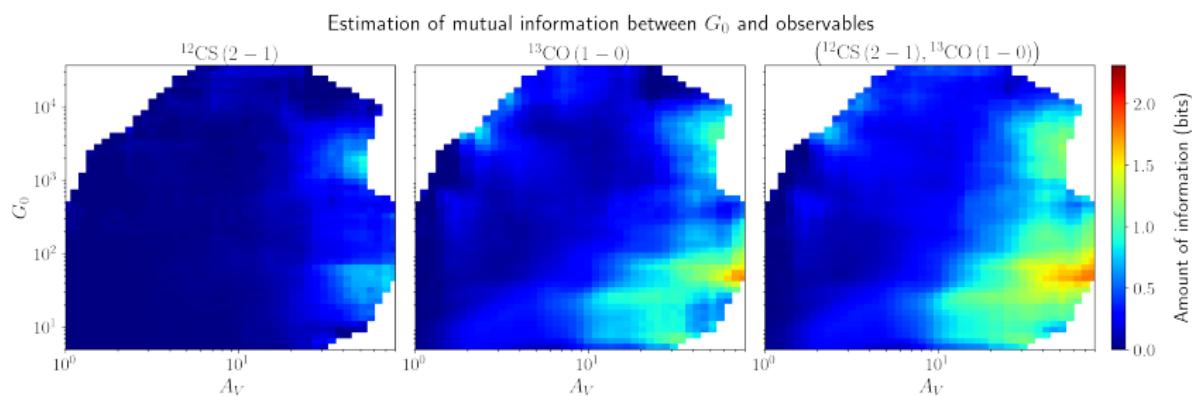
Informativity on G_0 of $(^{12}\text{CN}(1 - 0), ^{12}\text{CS}(2 - 1))$



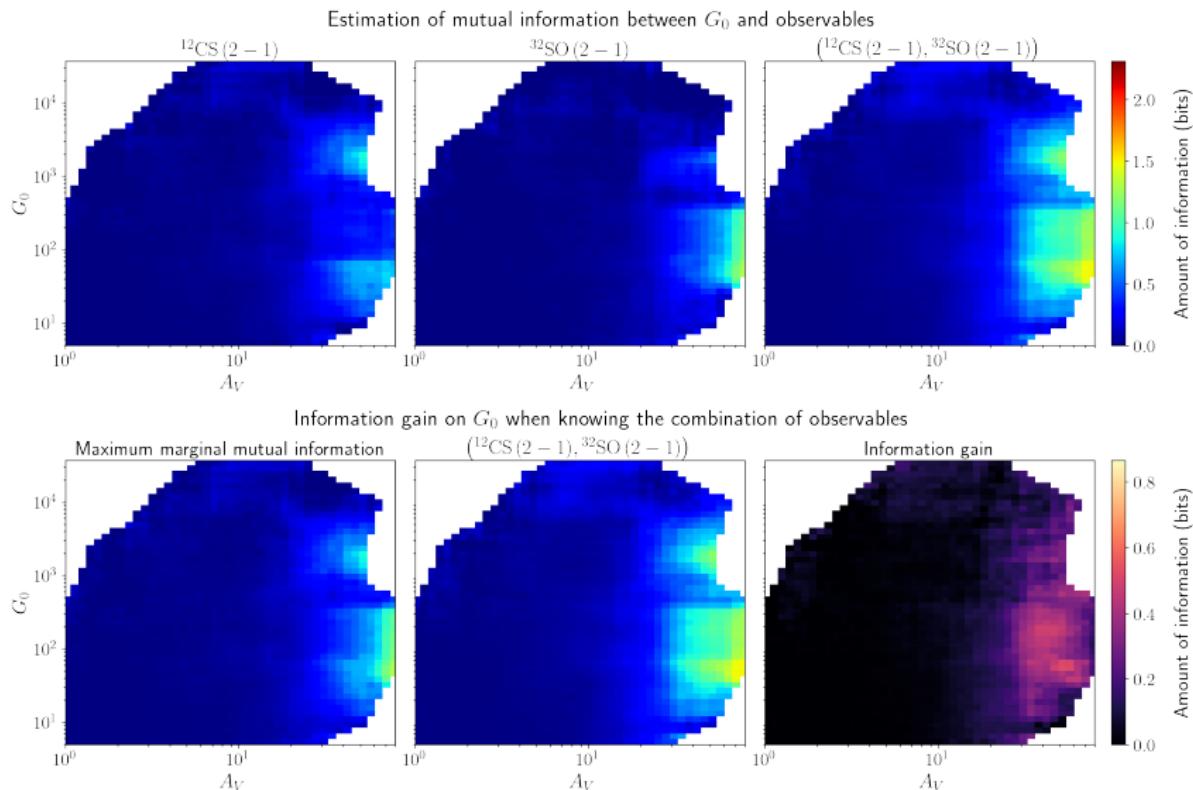
Informativity on G_0 of $(^{12}\text{CO} (1 - 0), ^{12}\text{CS} (2 - 1))$



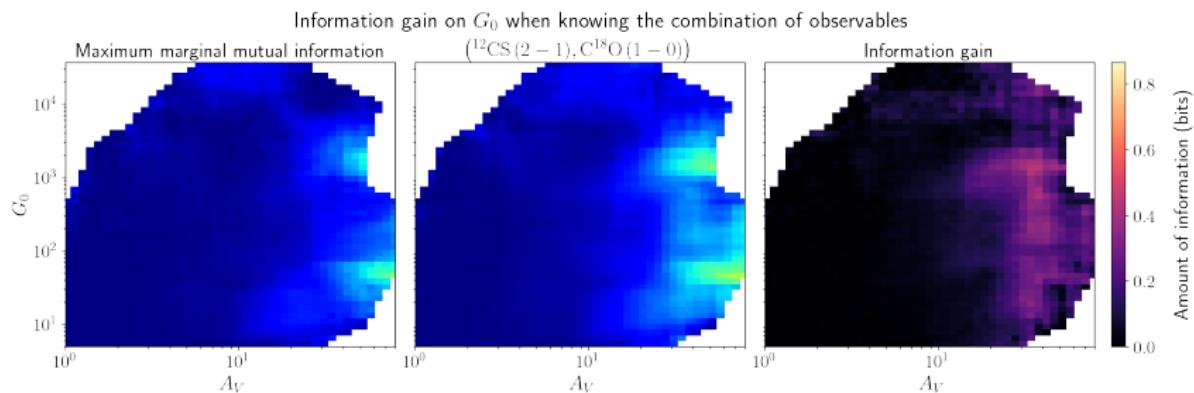
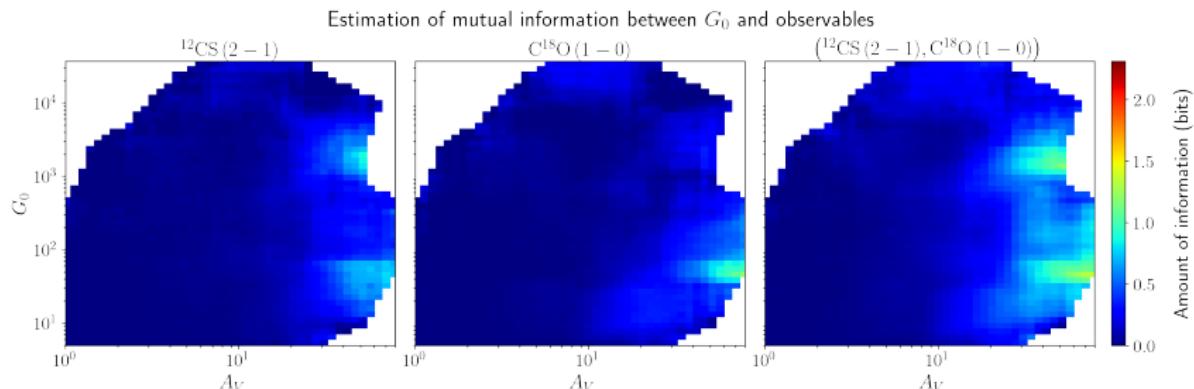
Informativity on G_0 of $(^{12}\text{CS}(2 - 1), ^{13}\text{CO}(1 - 0))$



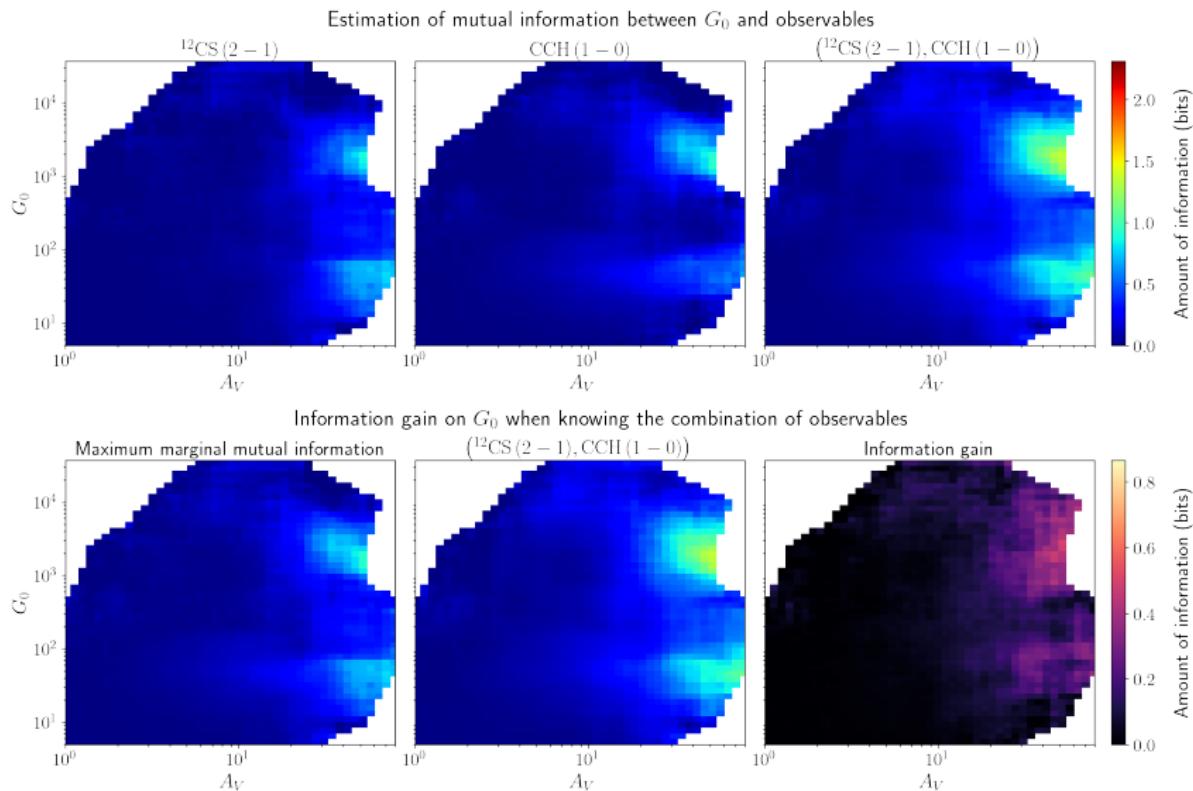
Informativity on G_0 of $(^{12}\text{CS} (2 - 1), ^{32}\text{SO} (2 - 1))$



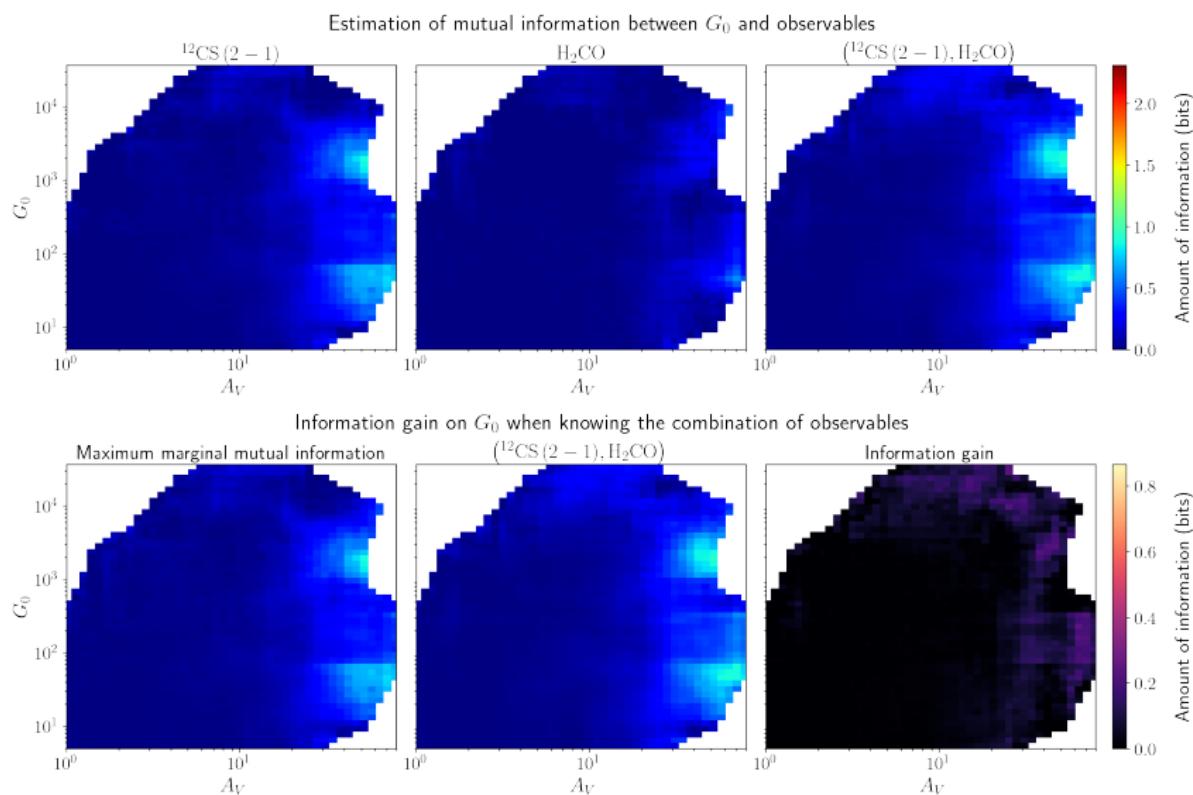
Informativity on G_0 of $(^{12}\text{CS} (2 - 1), \text{C}^{18}\text{O} (1 - 0))$



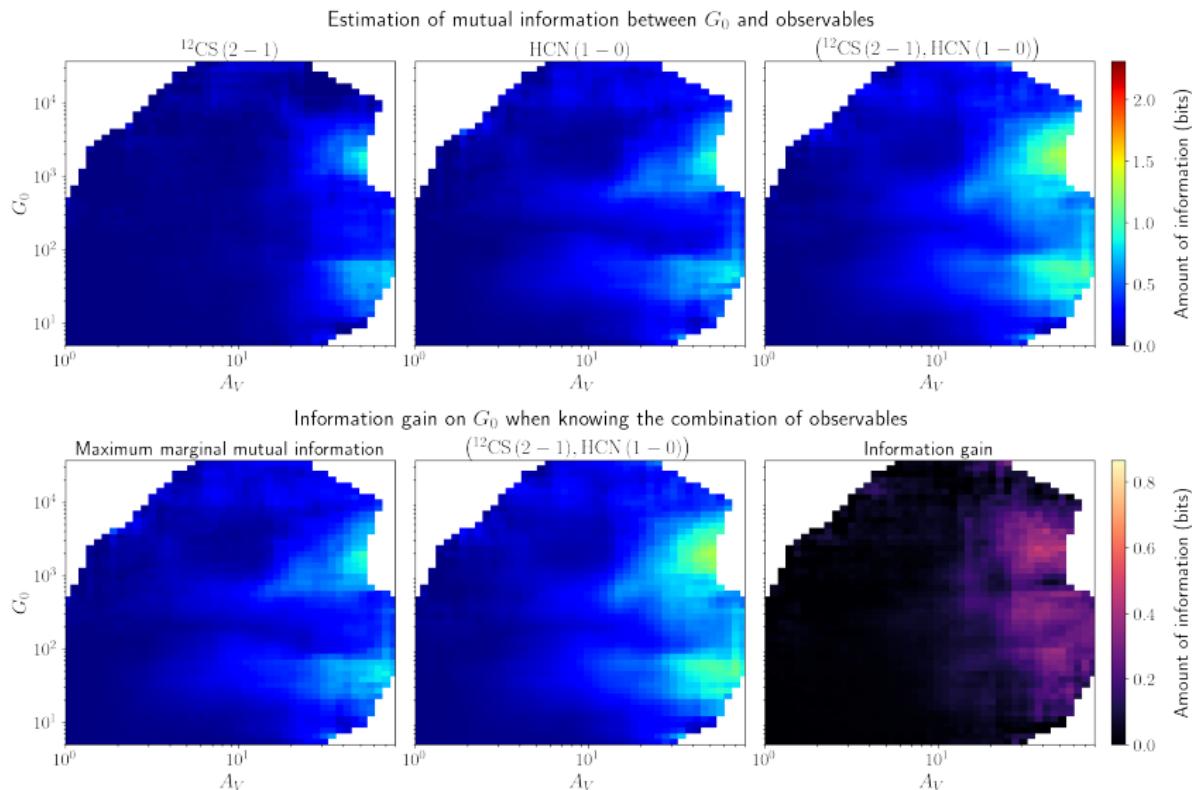
Informativity on G_0 of $(^{12}\text{CS}(2 - 1), \text{CCH}(1 - 0))$



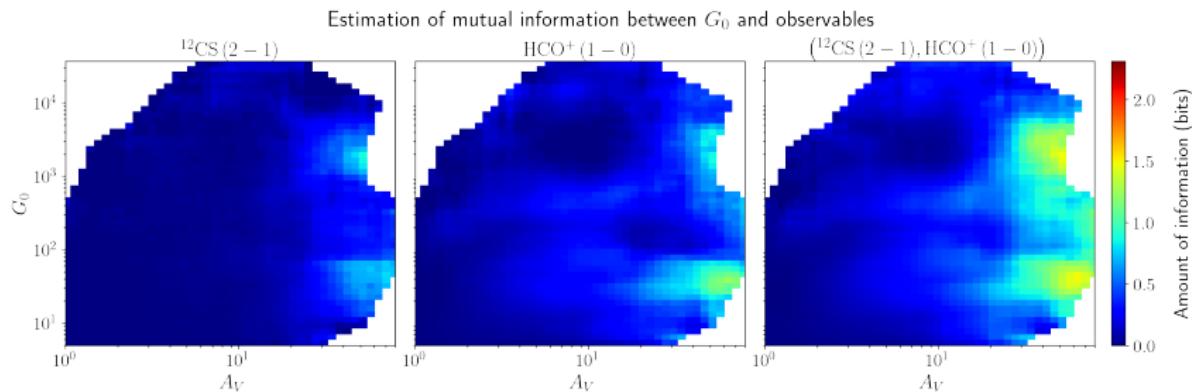
Informativity on G_0 of $(^{12}\text{CS}(2 - 1), \text{H}_2\text{CO})$



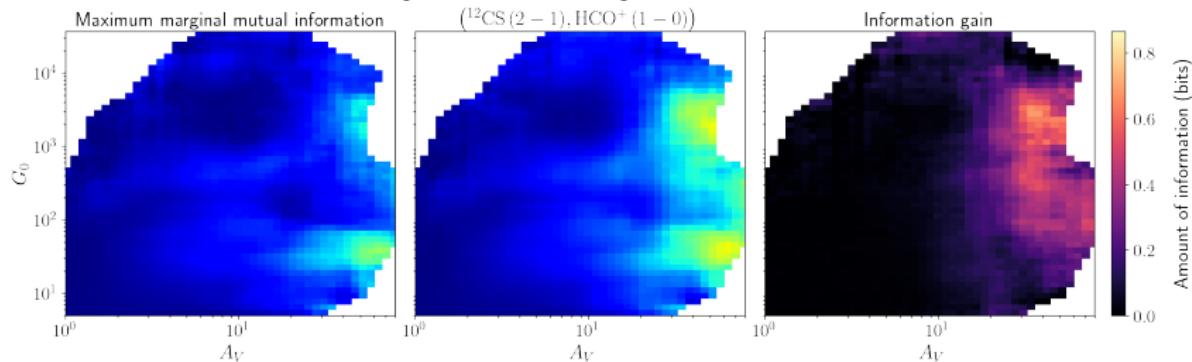
Informativity on G_0 of $(^{12}\text{CS} (2 - 1), \text{HCN} (1 - 0))$



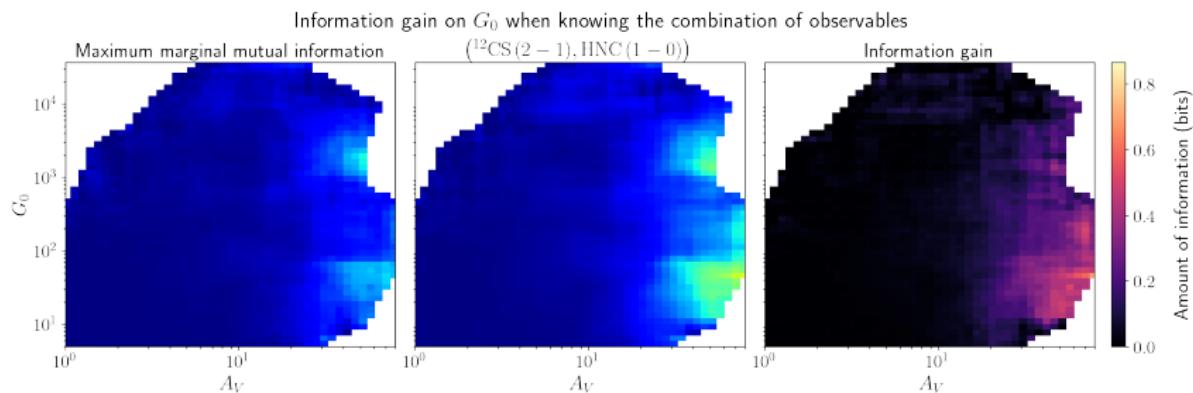
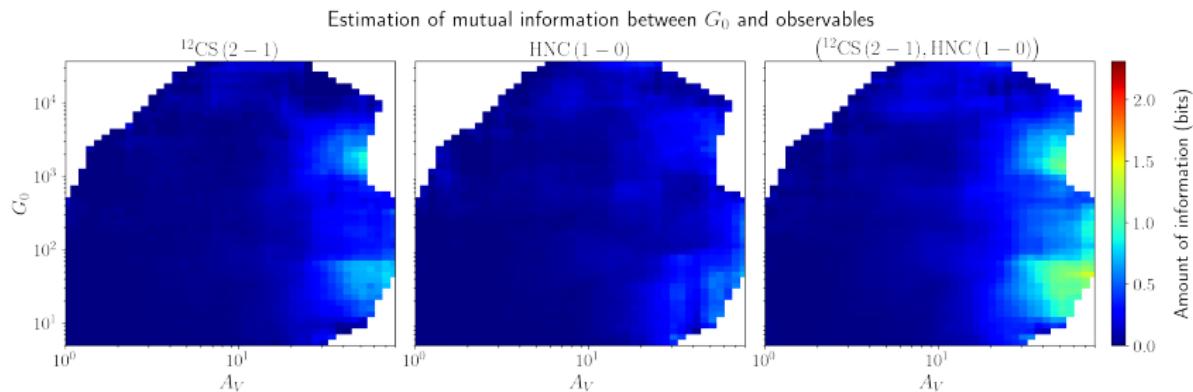
Informativity on G_0 of $(^{12}\text{CS}(2 - 1), \text{HCO}^+(1 - 0))$



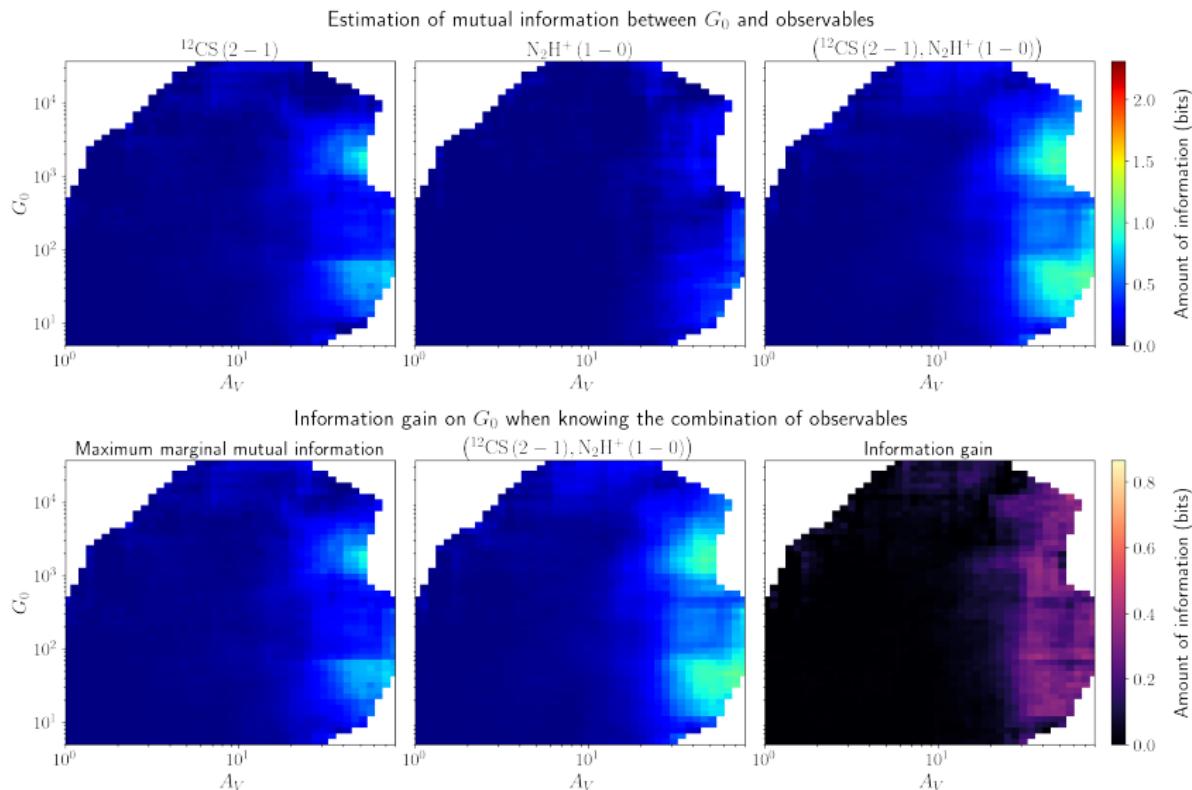
Information gain on G_0 when knowing the combination of observables



Informativity on G_0 of $(^{12}\text{CS}(2 - 1), \text{HNC}(1 - 0))$



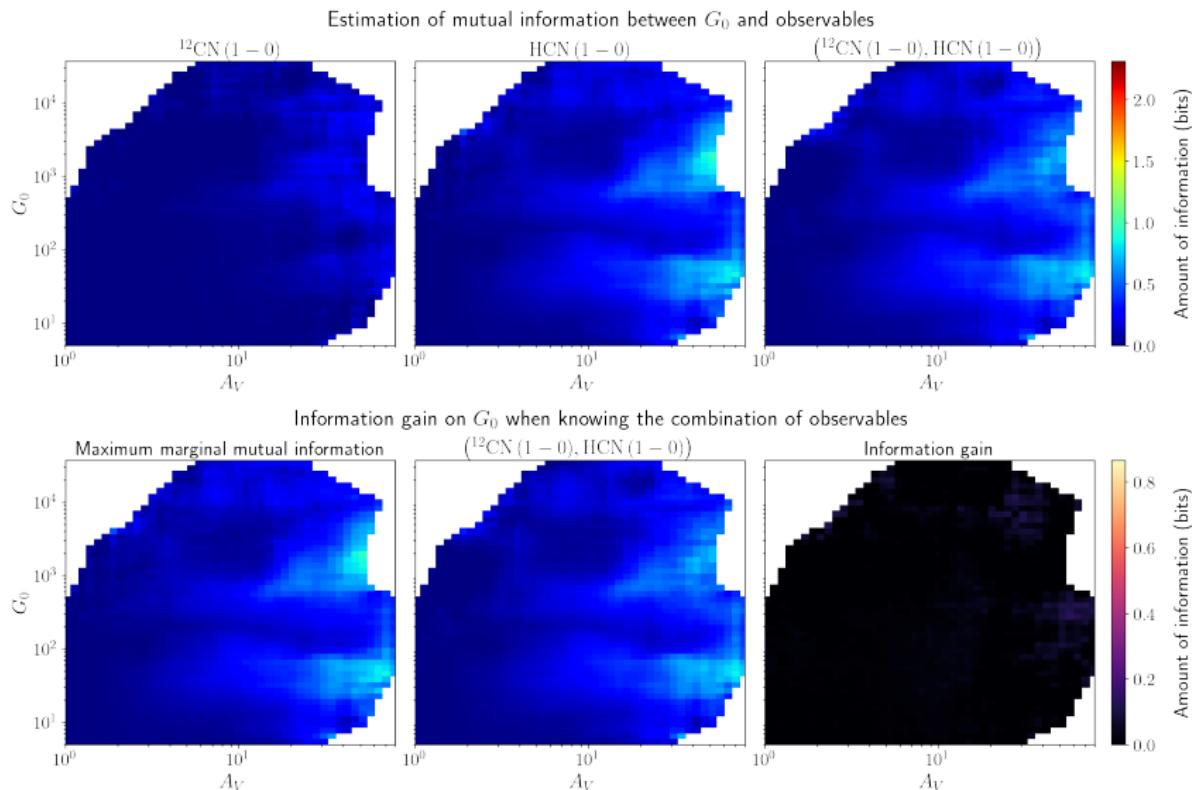
Informativity on G_0 of $(^{12}\text{CS} (2 - 1), \text{N}_2\text{H}^+ (1 - 0))$



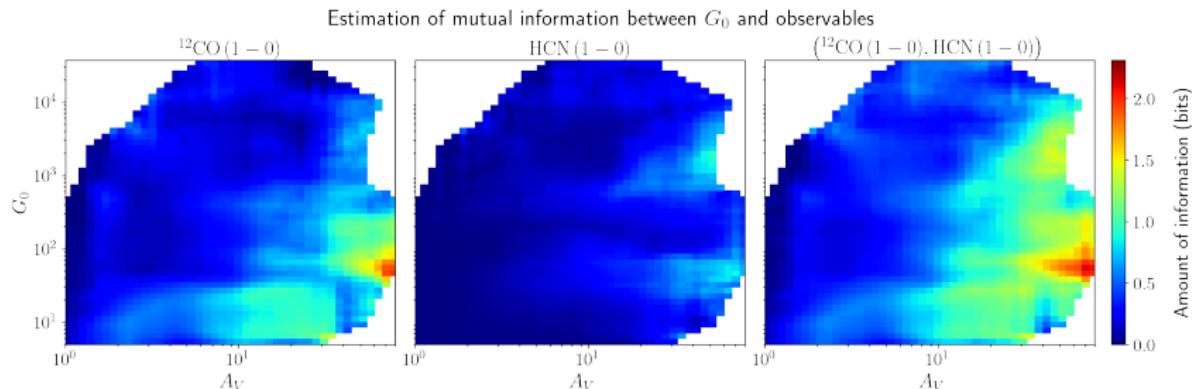
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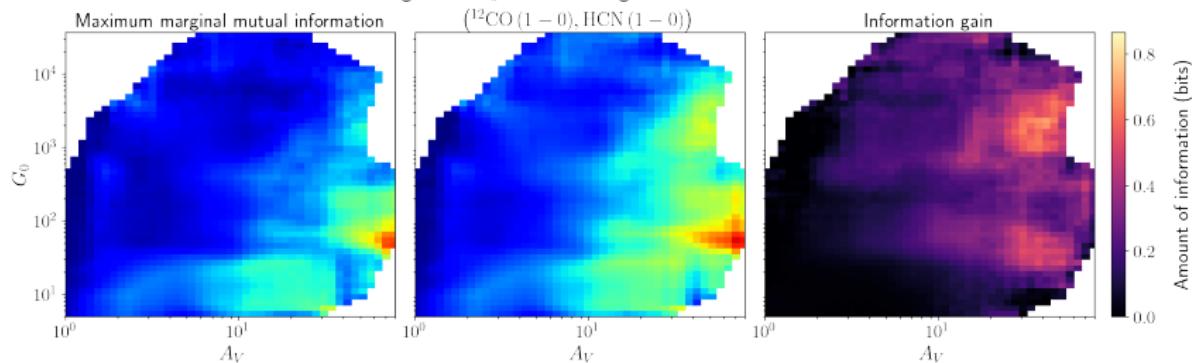
Informativity on G_0 of $(^{12}\text{CN}(1 - 0), \text{HCN}(1 - 0))$



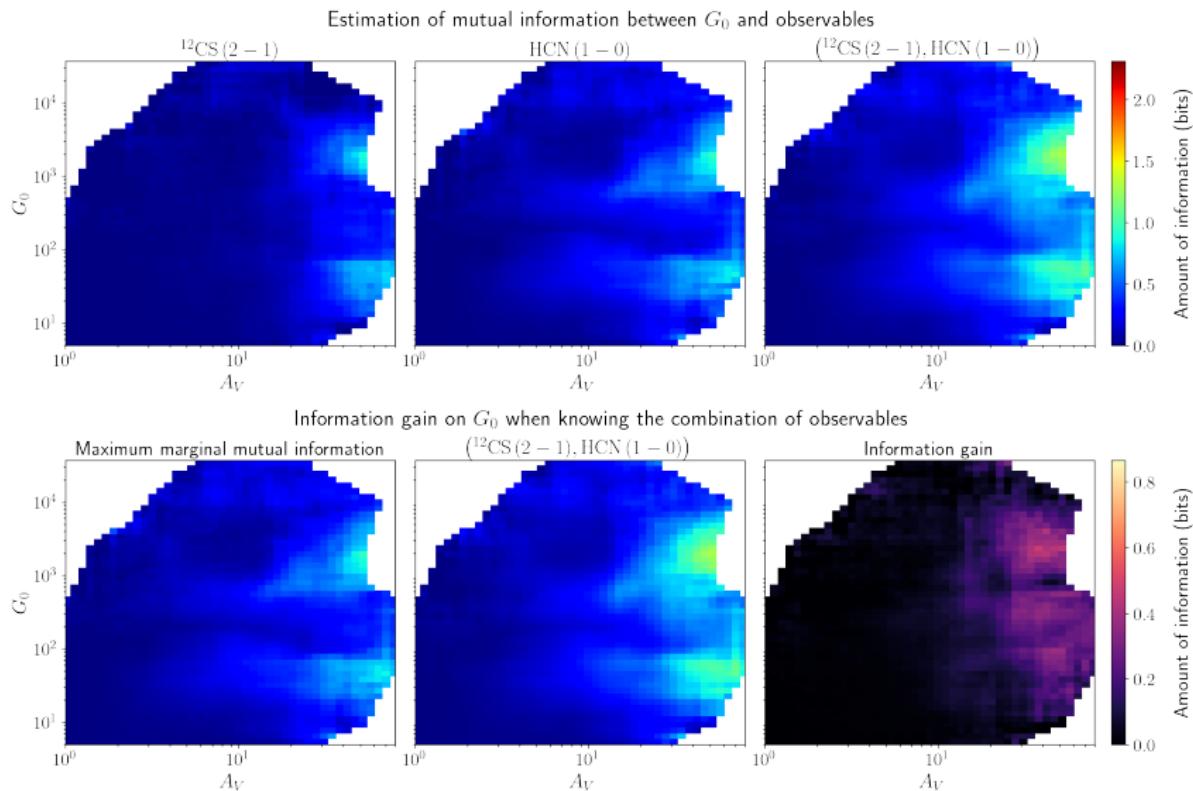
Informativity on G_0 of $(^{12}\text{CO} (1 - 0), \text{HCN} (1 - 0))$



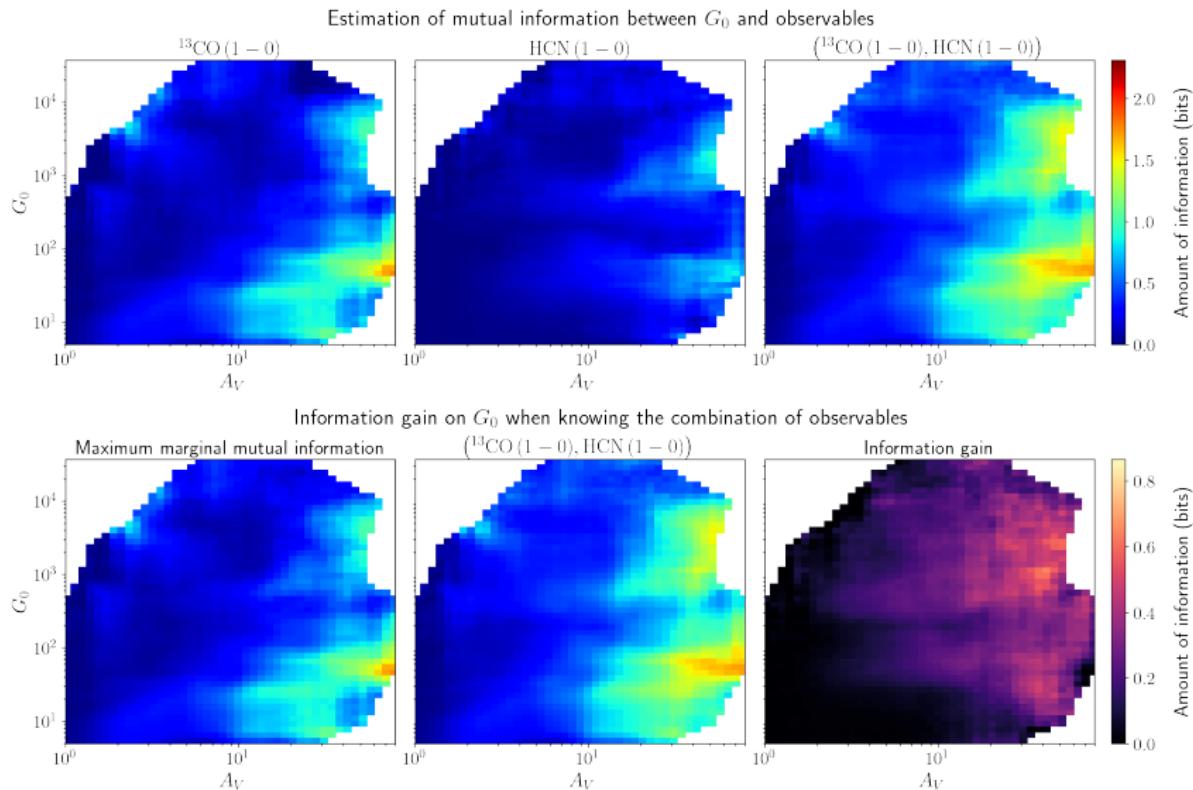
Information gain on G_0 when knowing the combination of observables



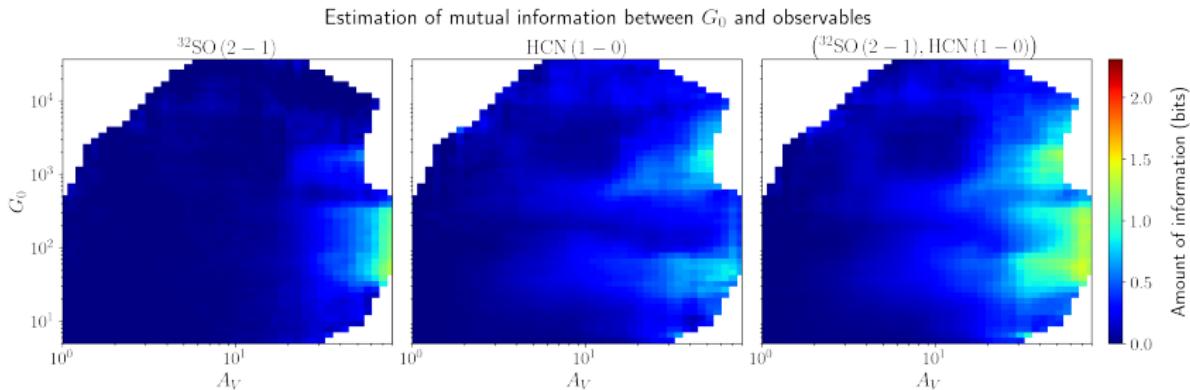
Informativity on G_0 of $(^{12}\text{CS} (2 - 1), \text{HCN} (1 - 0))$



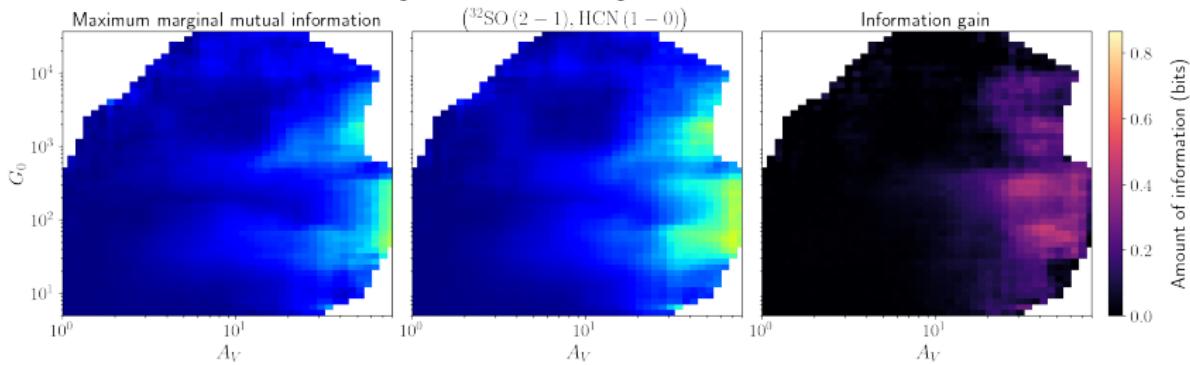
Informativity on G_0 of $(^{13}\text{CO} (1 - 0), \text{HCN} (1 - 0))$



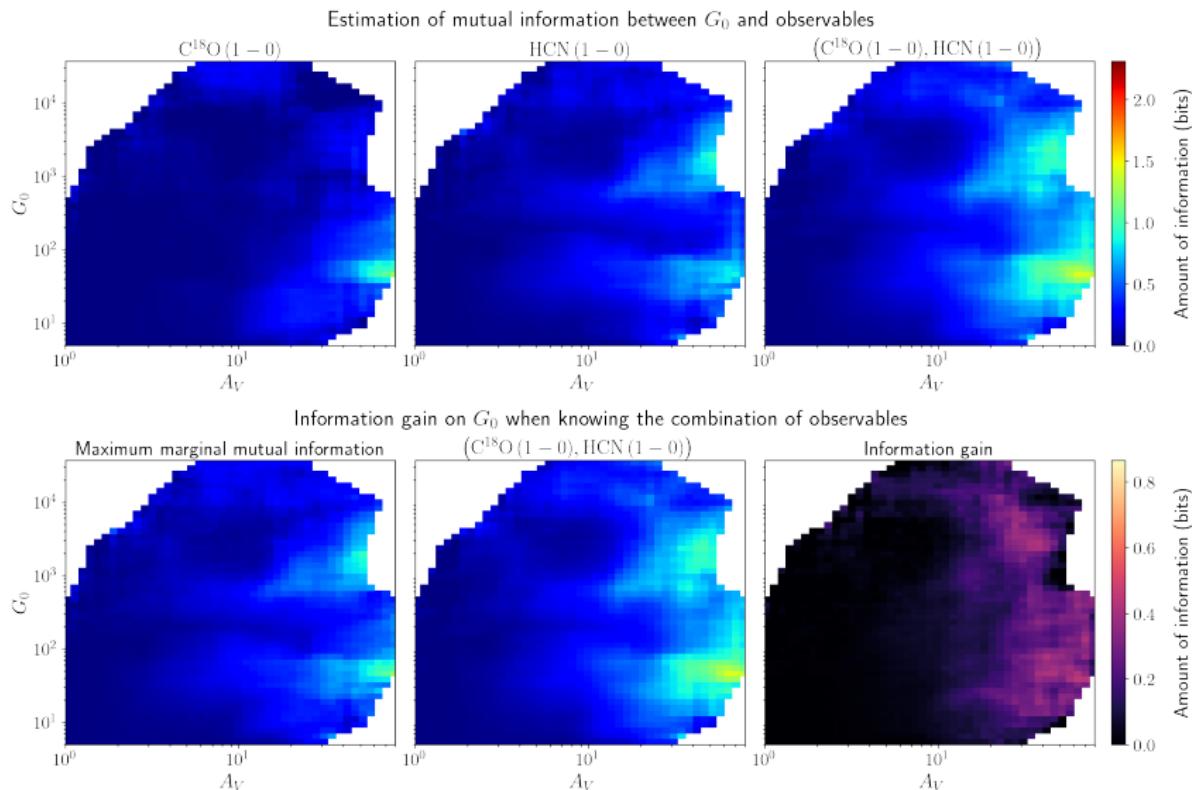
Informativity on G_0 of $(^{32}\text{SO}\,(2-1), \text{HCN}\,(1-0))$



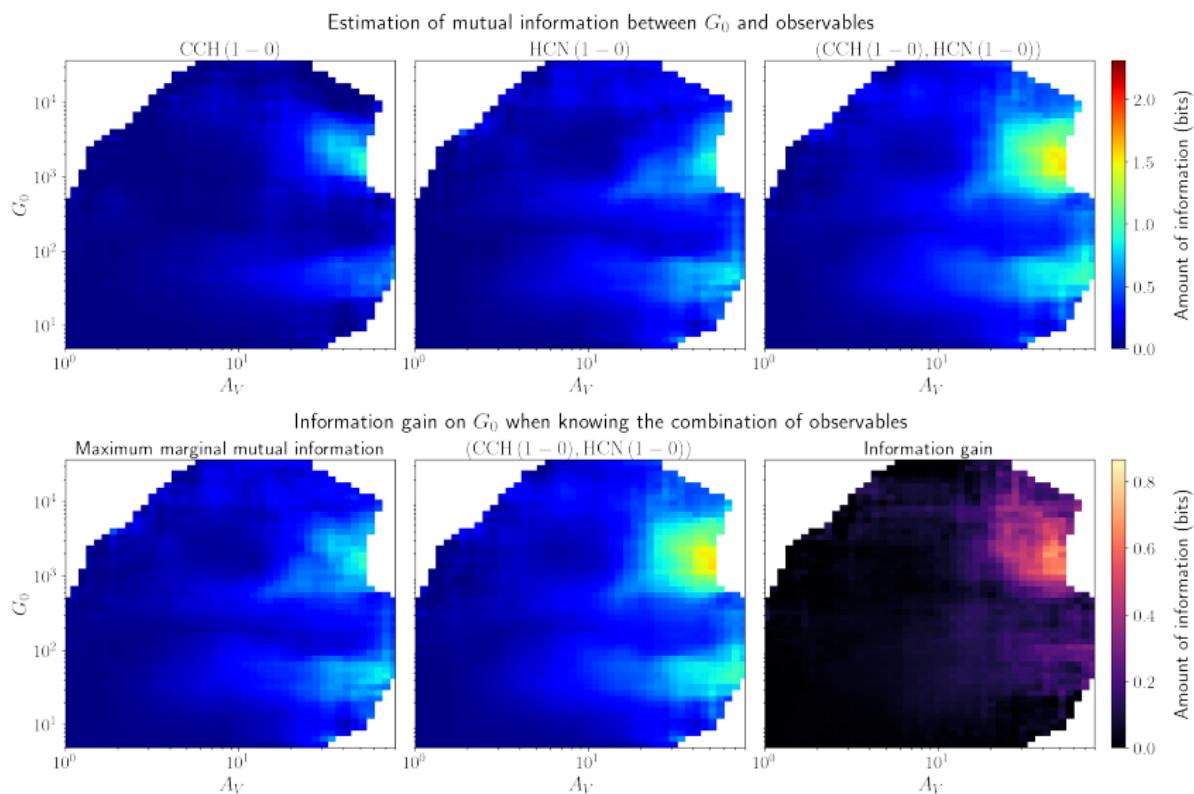
Information gain on G_0 when knowing the combination of observables



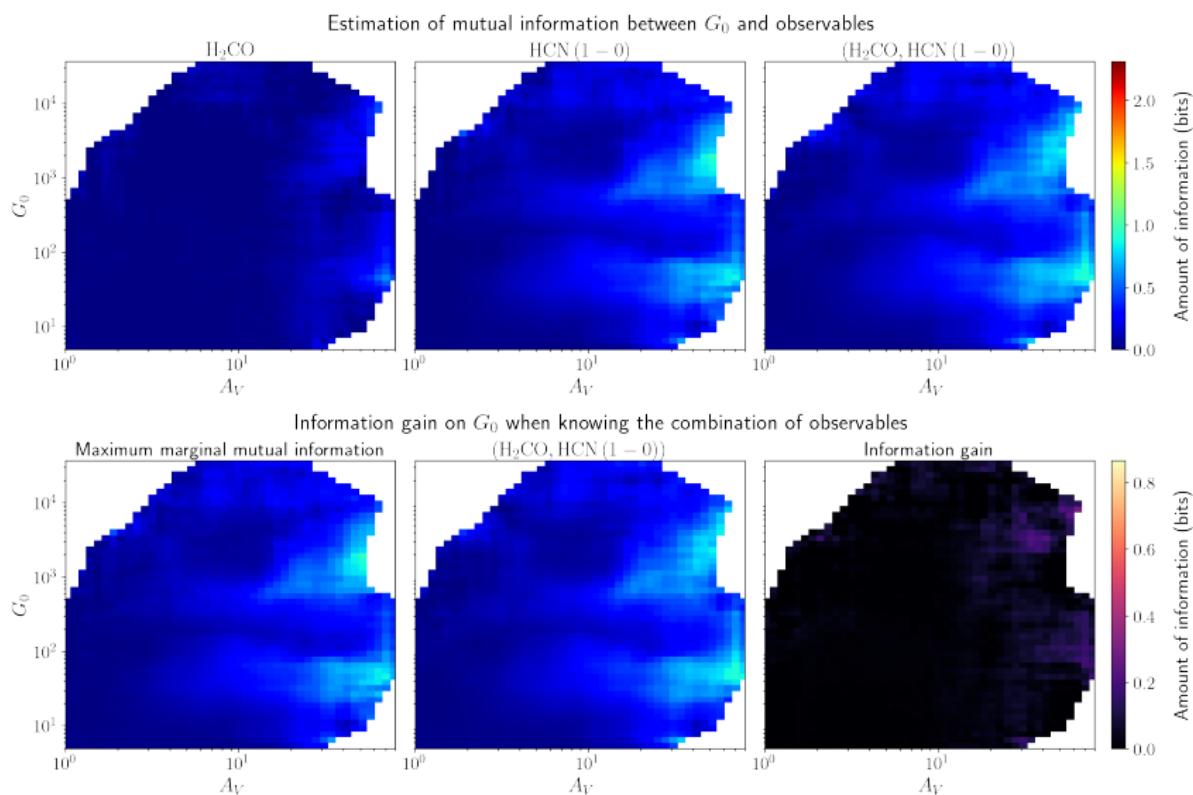
Informativity on G_0 of $(\text{C}^{18}\text{O} (1 - 0), \text{HCN} (1 - 0))$



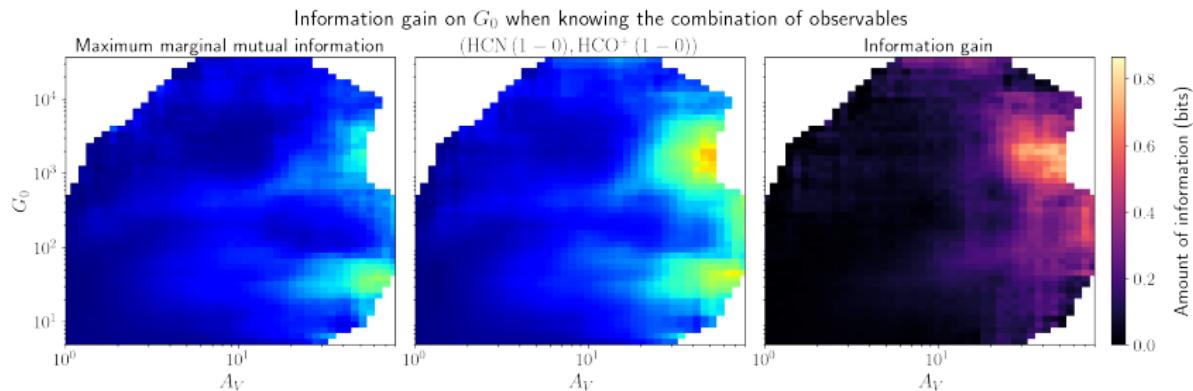
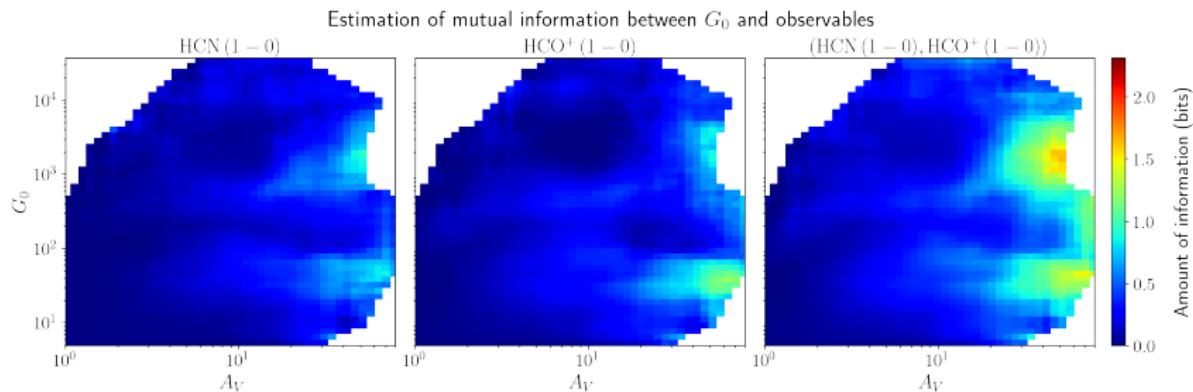
Informativity on G_0 of (CCH (1 - 0), HCN (1 - 0))



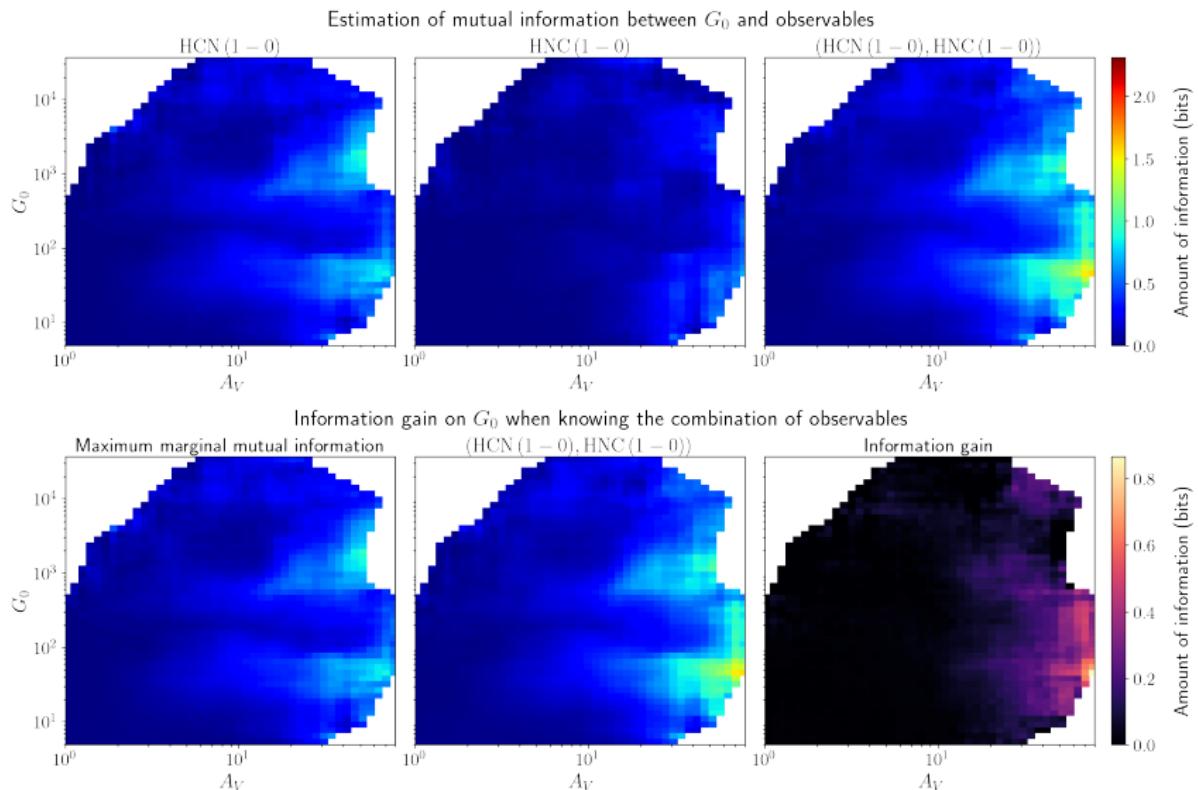
Informativity on G_0 of (H_2CO , $\text{HCN} (1 - 0)$)



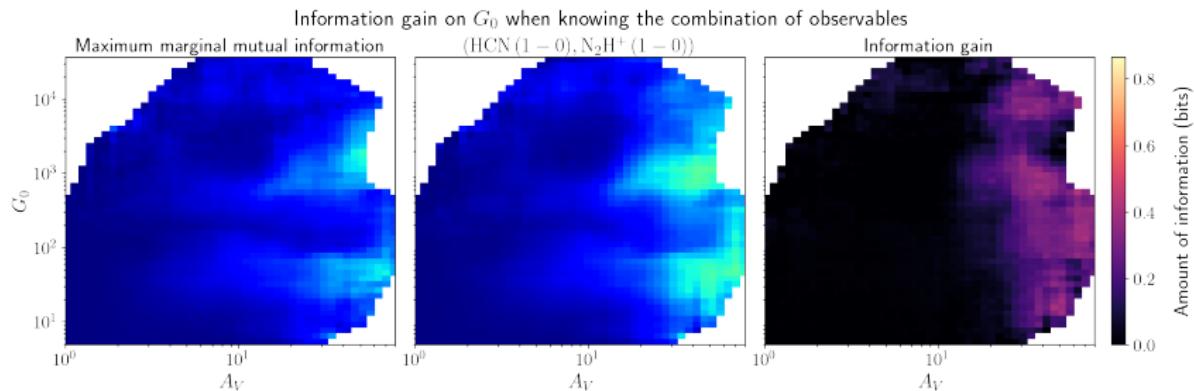
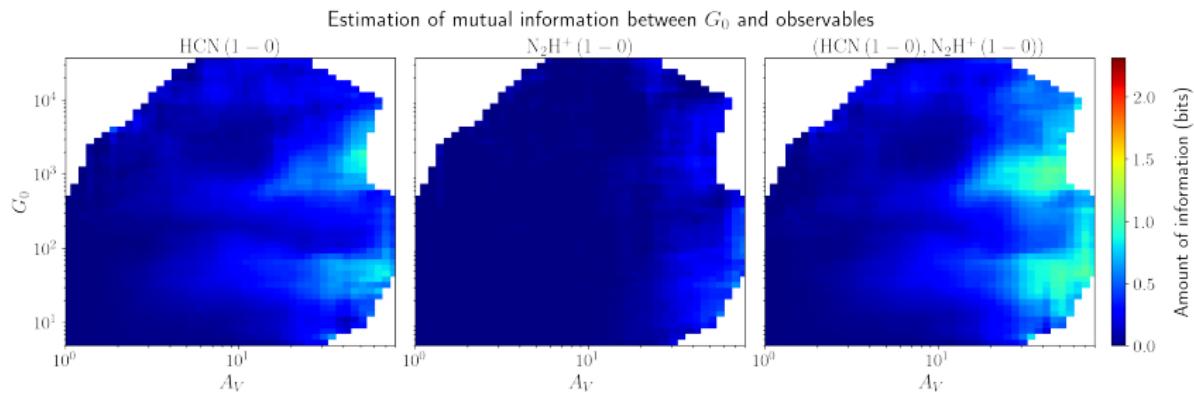
Informativity on G_0 of (HCN (1 – 0), HCO⁺ (1 – 0))



Informativity on G_0 of (HCN (1 - 0), HNC (1 - 0))



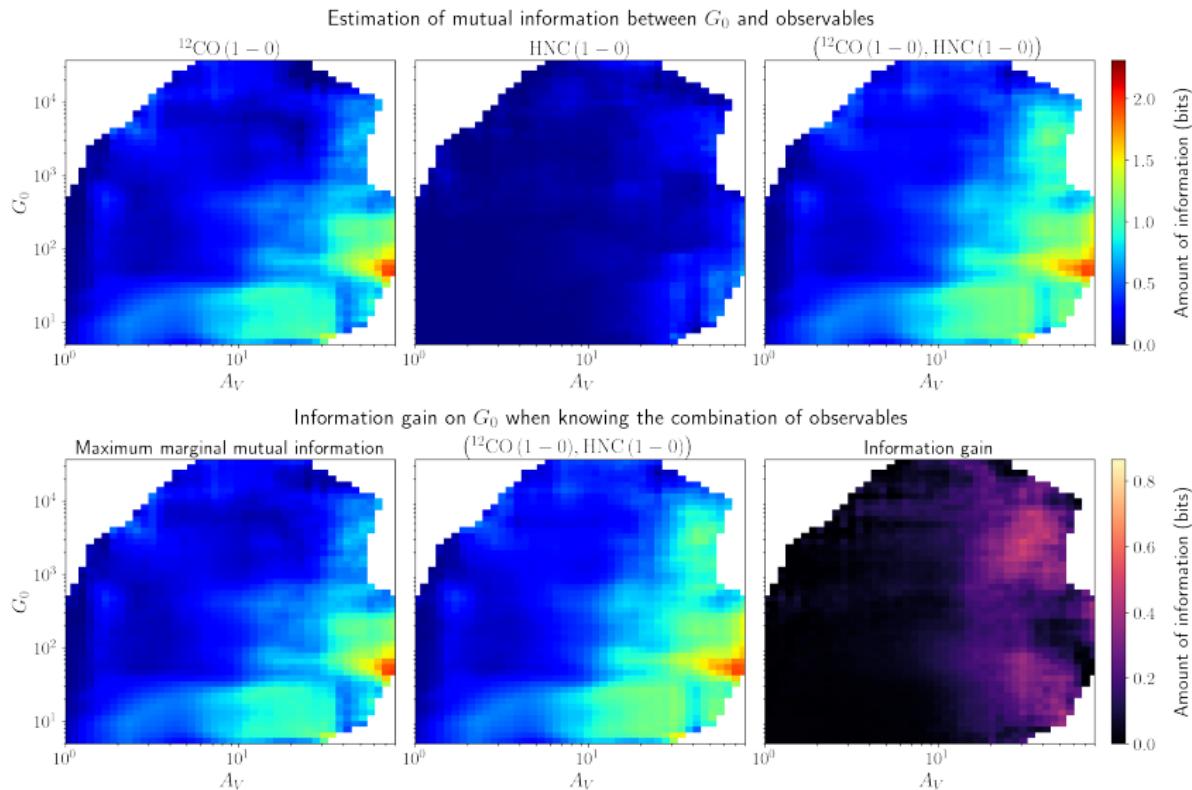
Informativity on G_0 of (HCN (1 - 0), N₂H⁺ (1 - 0))



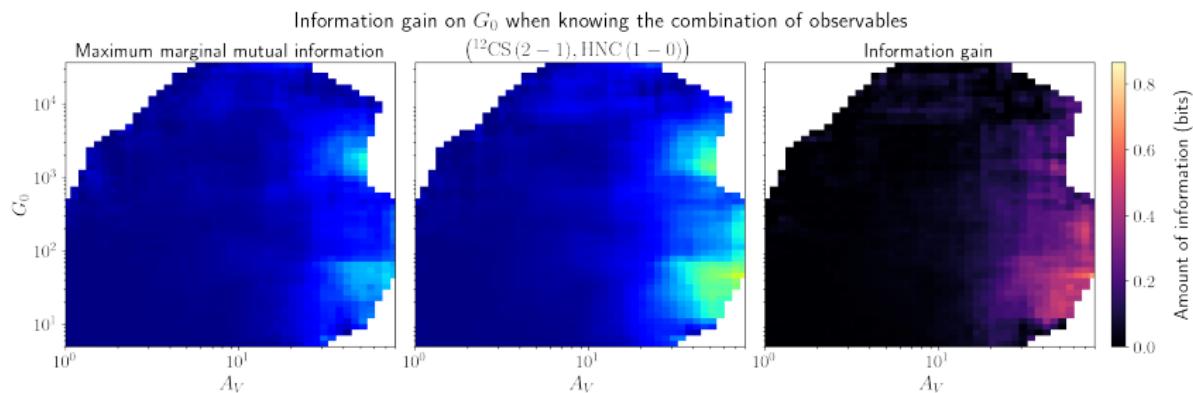
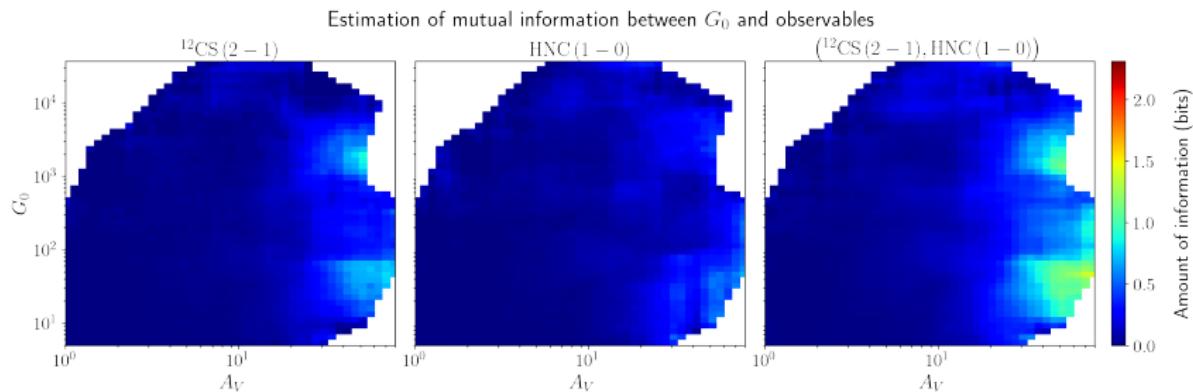
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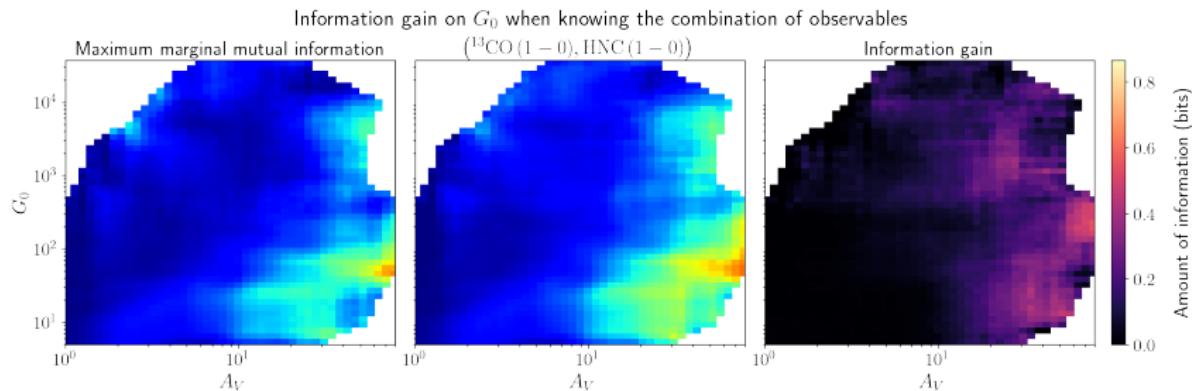
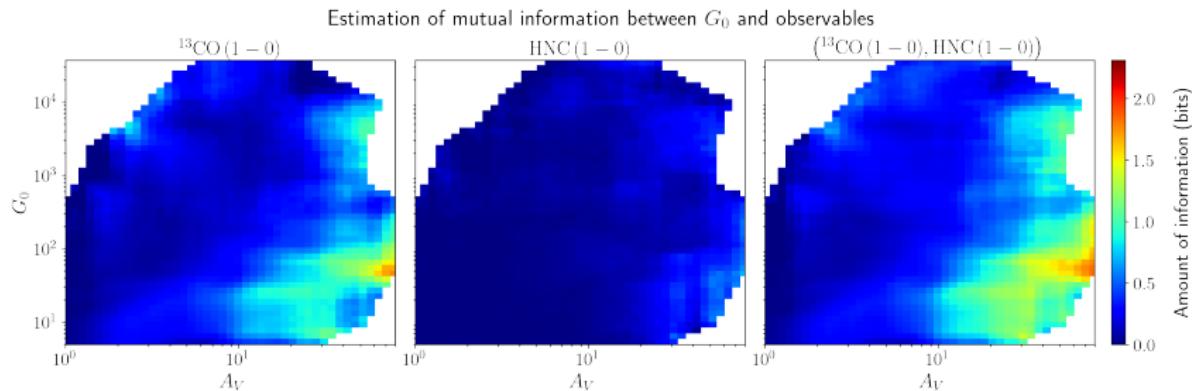
Informativity on G_0 of $(^{12}\text{CO} (1 - 0), \text{HNC} (1 - 0))$



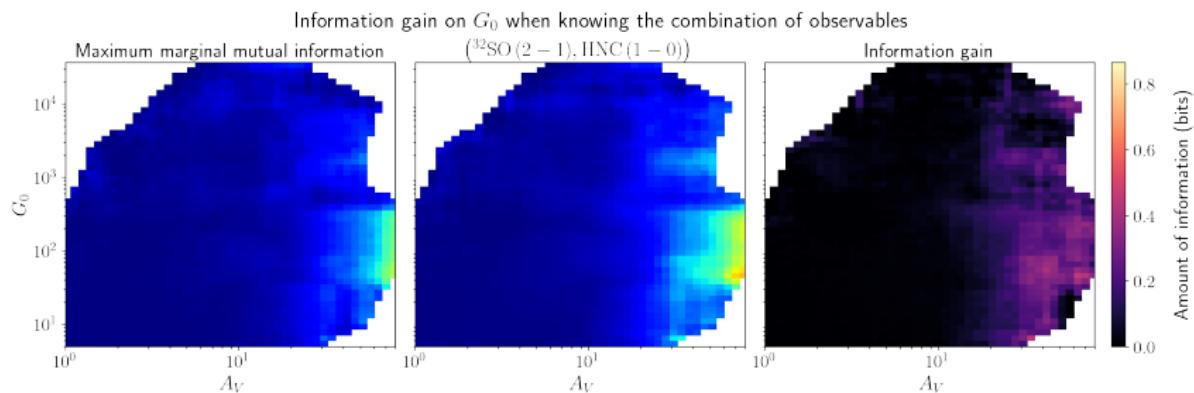
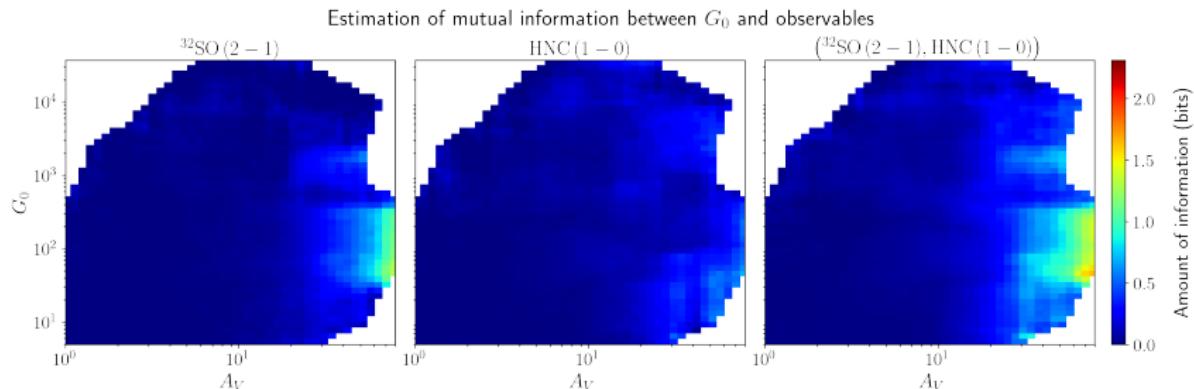
Informativity on G_0 of $(^{12}\text{CS}(2 - 1), \text{HNC}(1 - 0))$



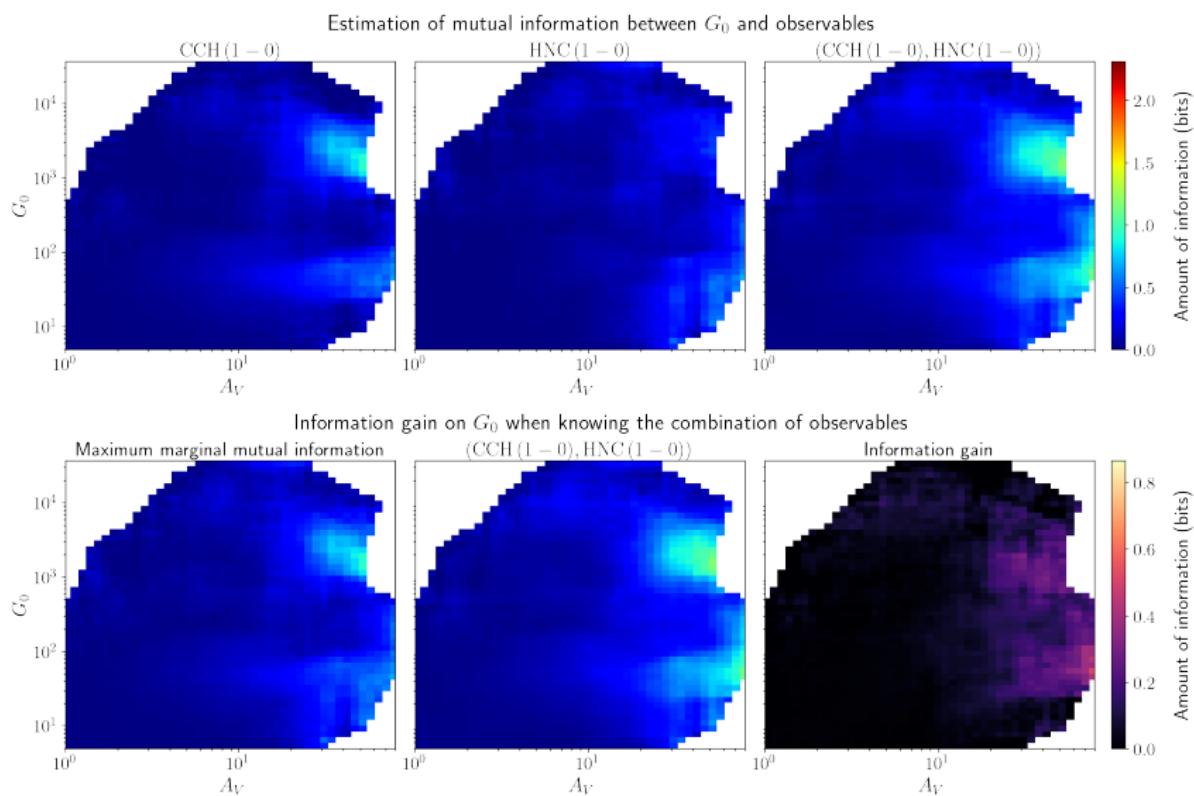
Informativity on G_0 of $(^{13}\text{CO} (1 - 0), \text{HNC} (1 - 0))$



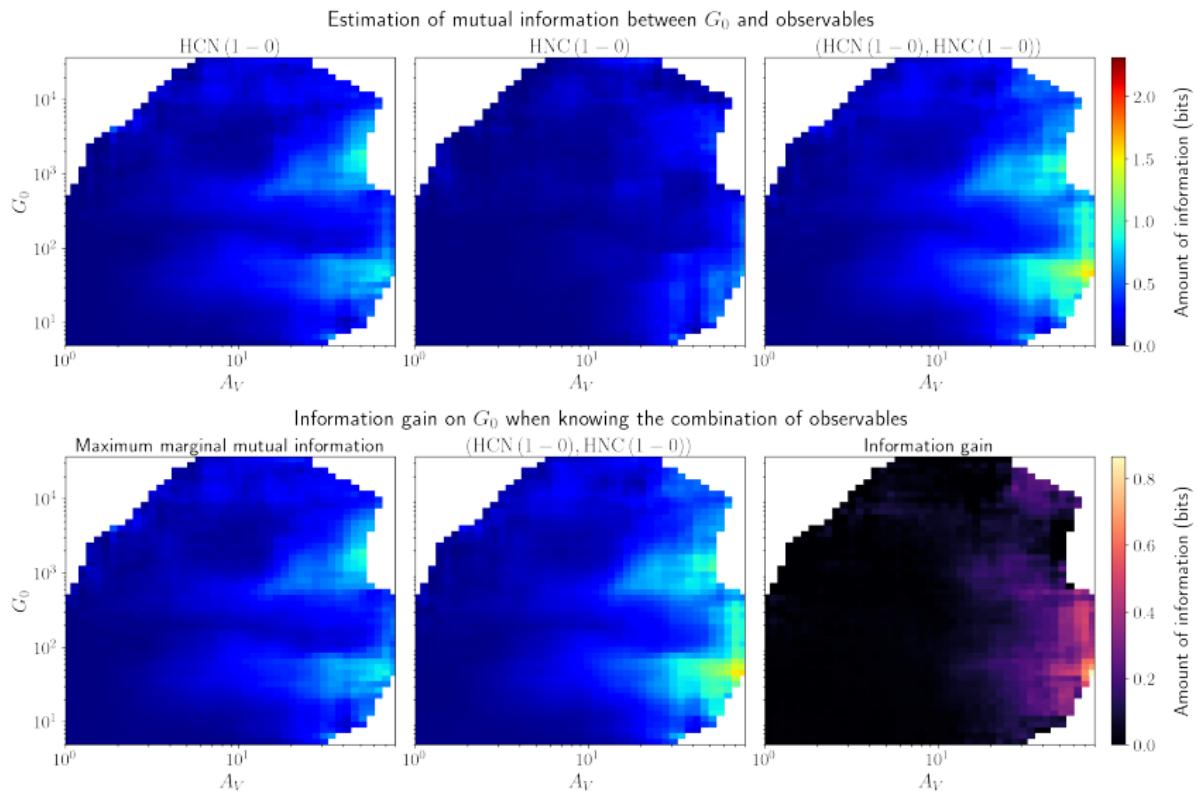
Informativity on G_0 of $(^{32}\text{SO} (2 - 1), \text{HNC} (1 - 0))$



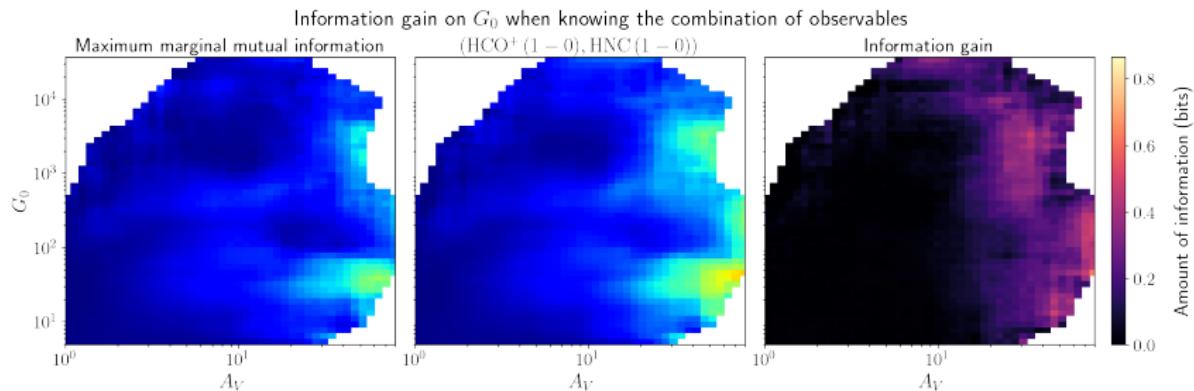
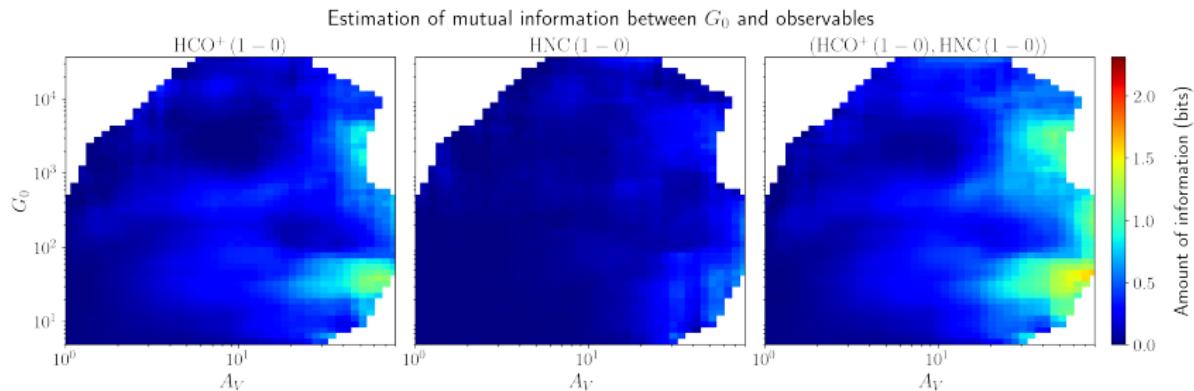
Informativity on G_0 of (CCH(1 - 0), HNC(1 - 0))



Informativity on G_0 of (HCN (1 - 0), HNC (1 - 0))



Informativity on G_0 of ($\text{HCO}^+ (1 - 0)$, $\text{HNC} (1 - 0)$)



Informativity on G_0 of (HNC (1 - 0), N₂H⁺ (1 - 0))

