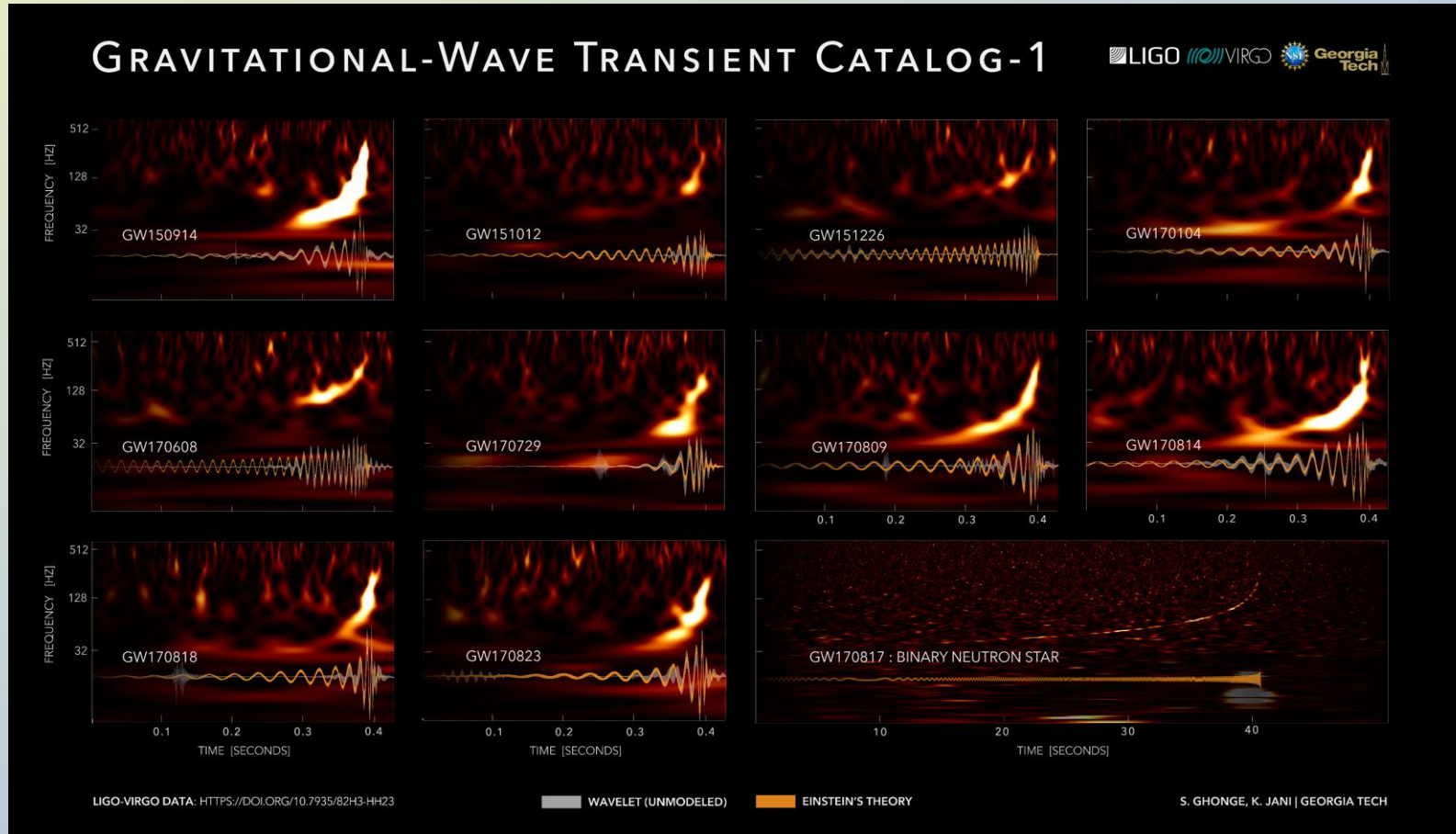


# Aprendizado de Máquina e análise de dados do LIGO



Tábata Aira Ferreira – WS2019

César Augusto Costa

- Consequências da alta sensibilidade de detectores de ondas gravitacionais;

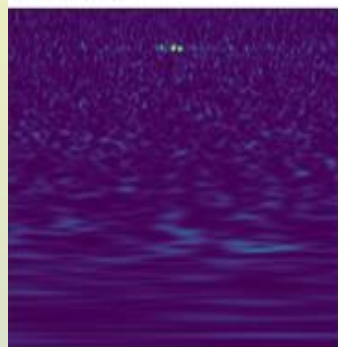
- Como LIGO tenta controlar/monitorar sinais de falsos candidatos a OG;



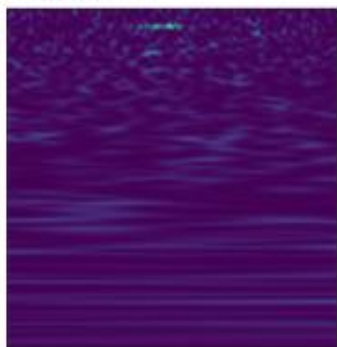
- Estudos de transientes apontam padrões morfológicos no seguinte espaço de parâmetros: *frequência, tempo e SNR*.



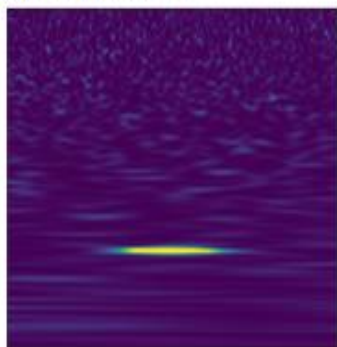
1080Lines



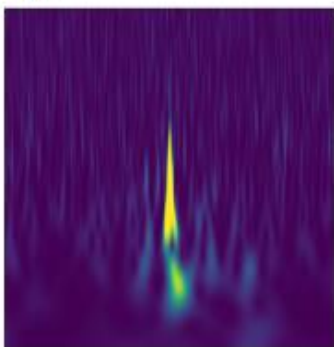
1400Ripples



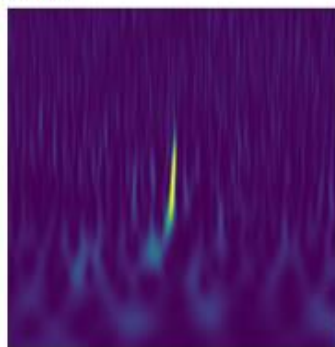
Air\_Compressor



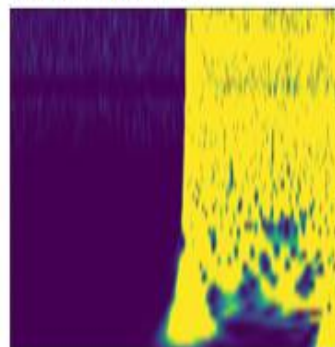
Blip



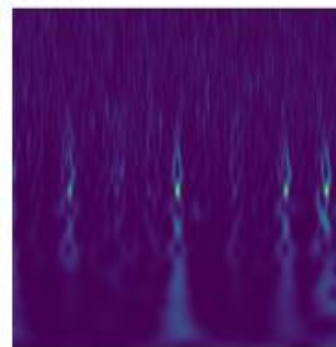
Chirp



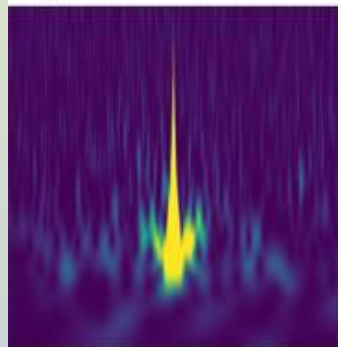
Extremely\_Loud



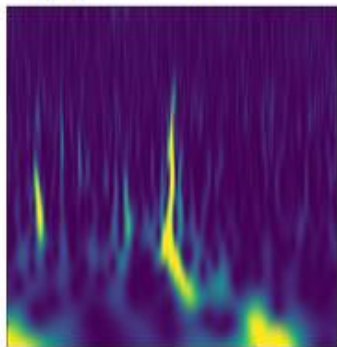
Helix



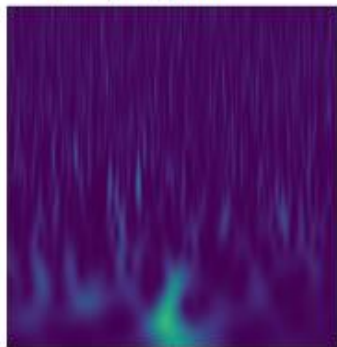
Koi\_Fish



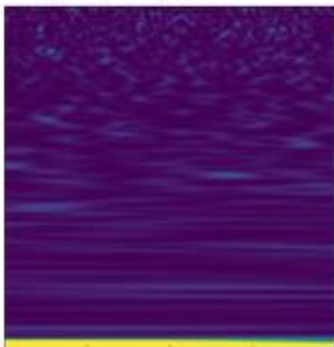
Light\_Modulation



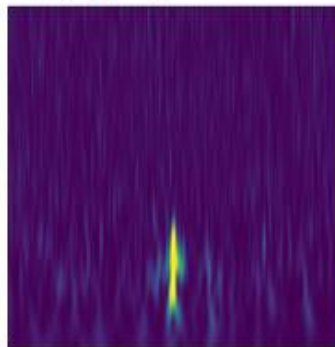
Low\_Frequency\_Burst



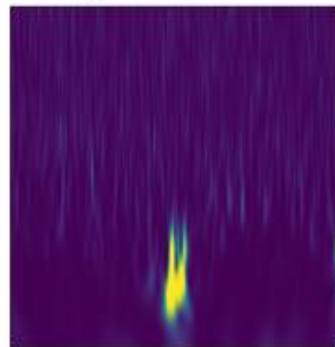
Low\_Frequency\_Lines



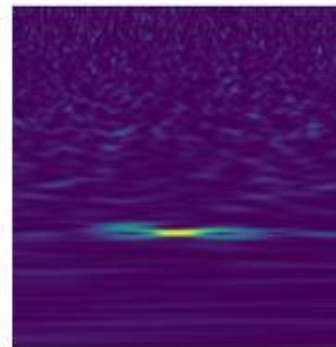
None\_of\_the\_Above



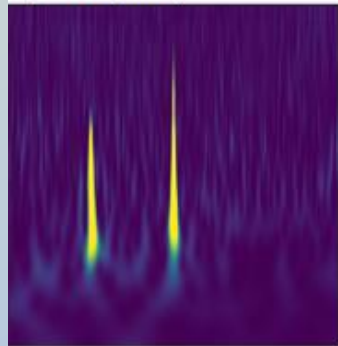
Paired\_Doves



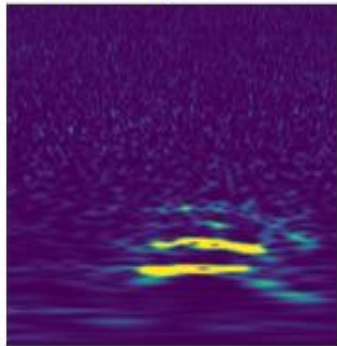
Power\_Line



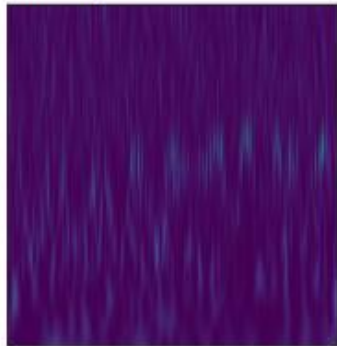
Repeating\_Blips



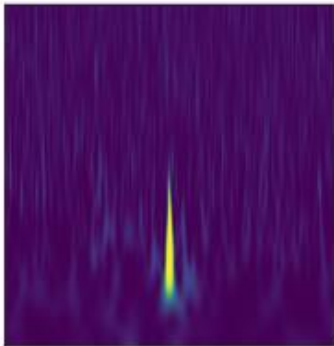
Scattered\_Light



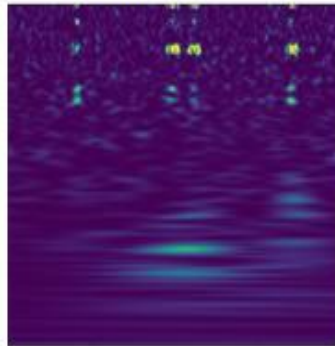
Scratchy



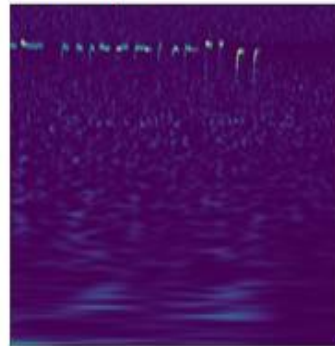
Tomte



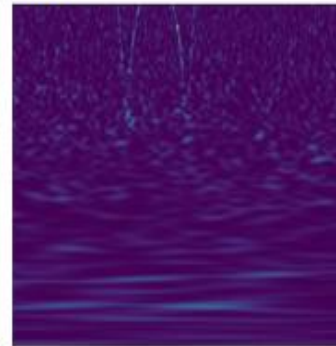
Violin\_Mode



Wandering\_Line



Whistle

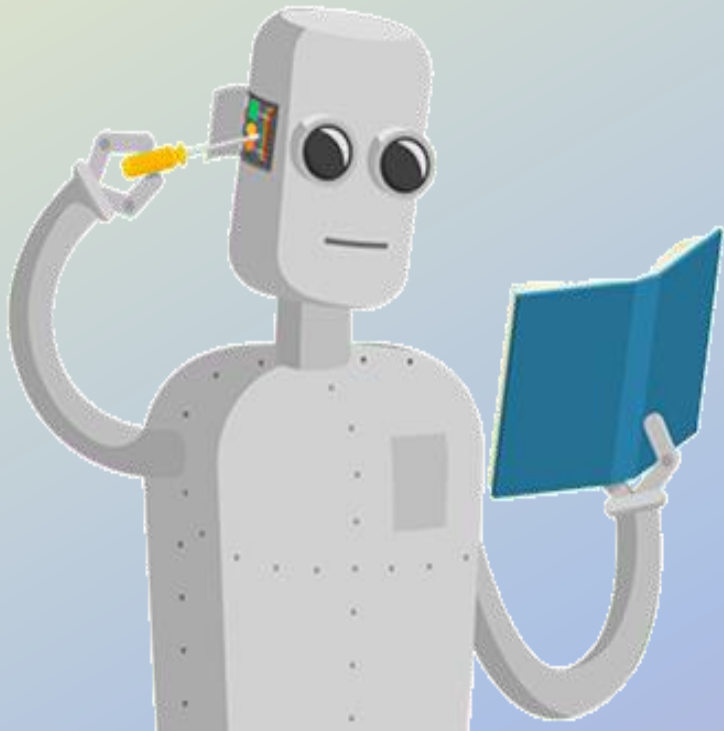


**Tabela 1:** *Alguns glitches classificados durante a primeira corrida do aLIGO.*

<b>Grupo de ruído</b>	<b>Total</b>	<b>Livingston</b>	<b>Hanford</b>
Blip	1869 (24.2%)	374 (12.7%)	1495 (31.4%)
Extremely loud	453 (5.9%)	187 (6.3%)	266 (5.6%)
Helix	279 (3.6%)	276 (9.4%)	3 (0.1%)
Koi Fish	829 (10.7%)	250 (8.5%)	579 (12.1%)
Light Modulation	573 (7.4%)	5 (0.2%)	568 (11.9%)
Low frequency line	452 (5.9%)	371 (12.6%)	81 (1.7%)
None of the above	189 (2.4%)	36 (1.2%)	153 (3.2%)
Power line	54 (0.7%)	0 (0.0%)	54 (1.1%)
Repeating blips	454 (5.9%)	180 (12.6%)	274 (1.7%)
Scattered light	453 (5.9%)	59 (2.0%)	394 (8.3%)
Violin mode harmonic	178 (2.3%)	0 (0.0%)	178 (3.7%)
Whistle	305 (4.0%)	303 (10.3%)	2 (0.0%)

- Classificações feitas manualmente;
- Nosso trabalho visa automatizar esse processos;

# Aplicação de AM aos dados do LIGO

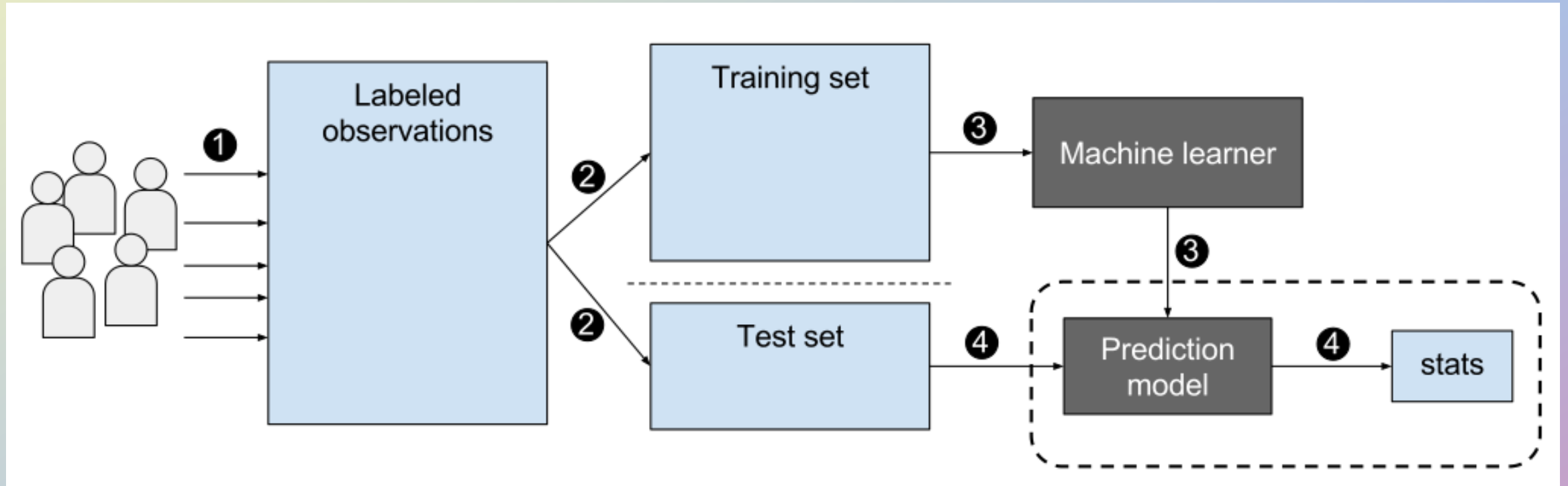


Supervisionado



Não Supervisionado

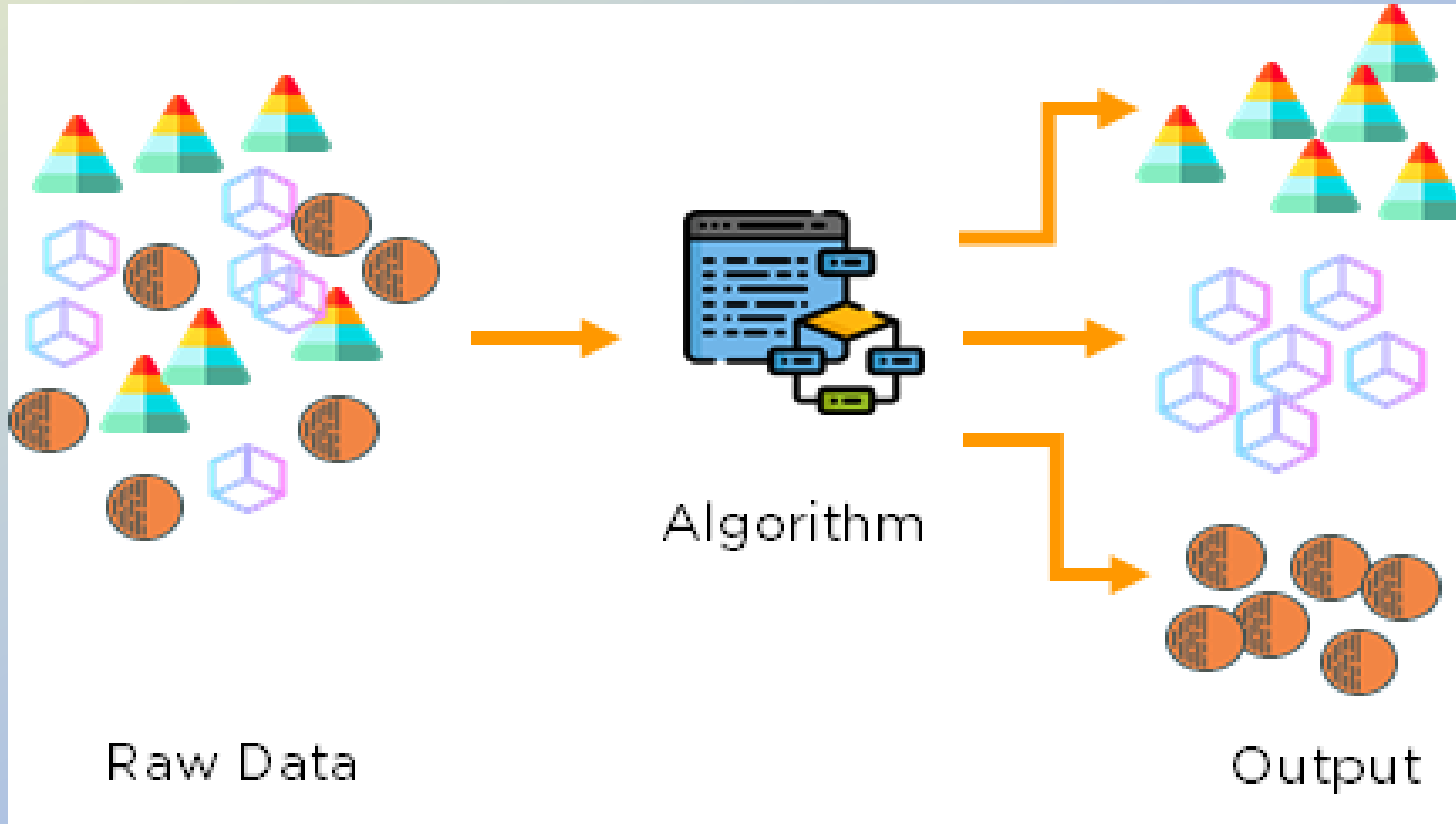
# AM Supervisionado



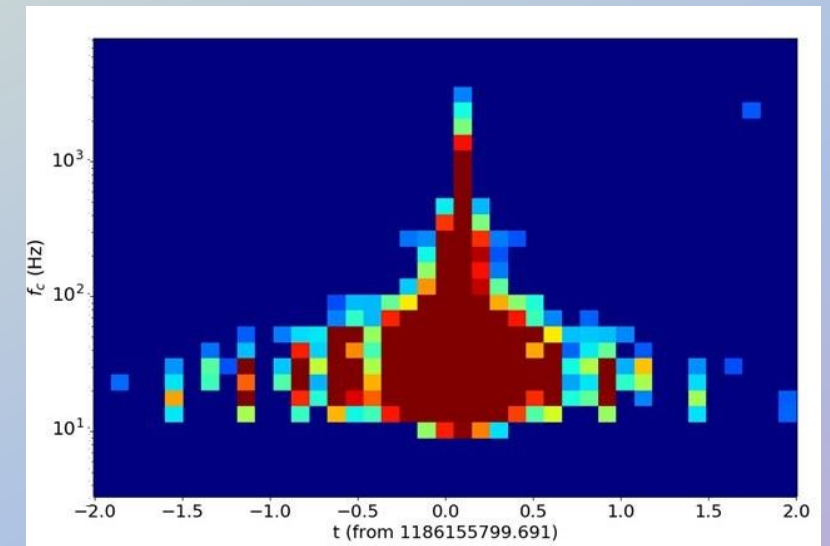
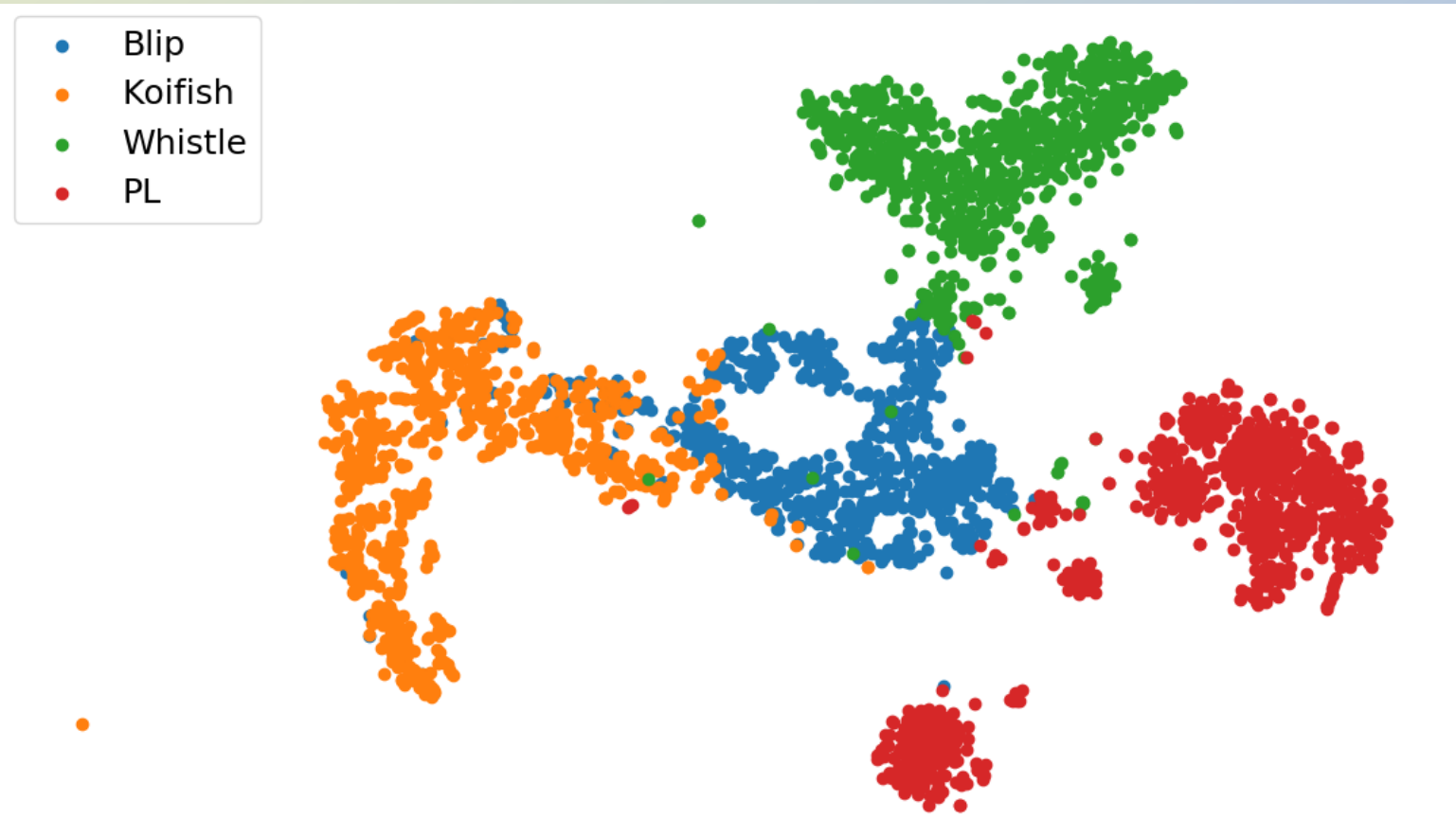
- OMICRON e parâmetros atribuídos aos transientes;
- Testes e resultados obtidos com as previsões;



- A busca pelo AM não supervisionado: *caracterização de Glitches*

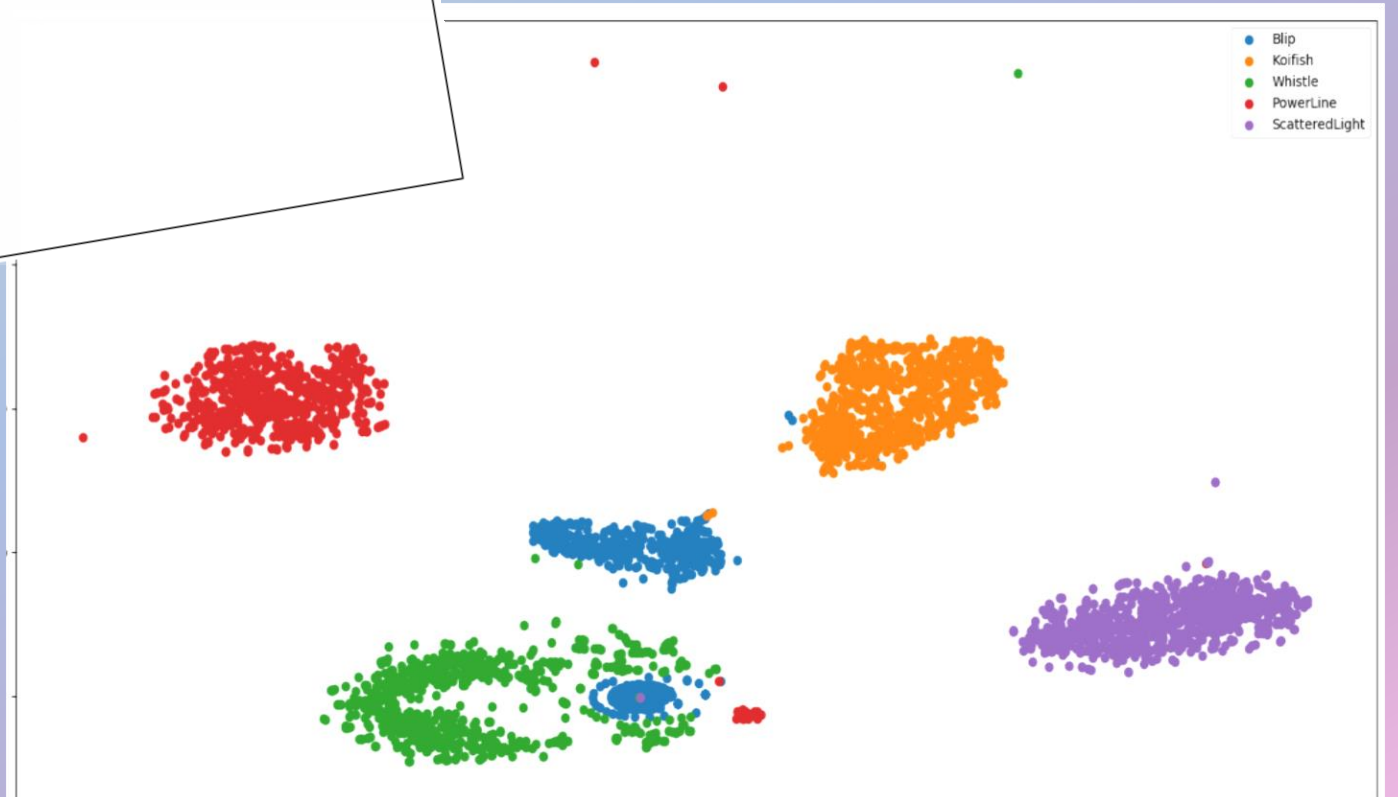
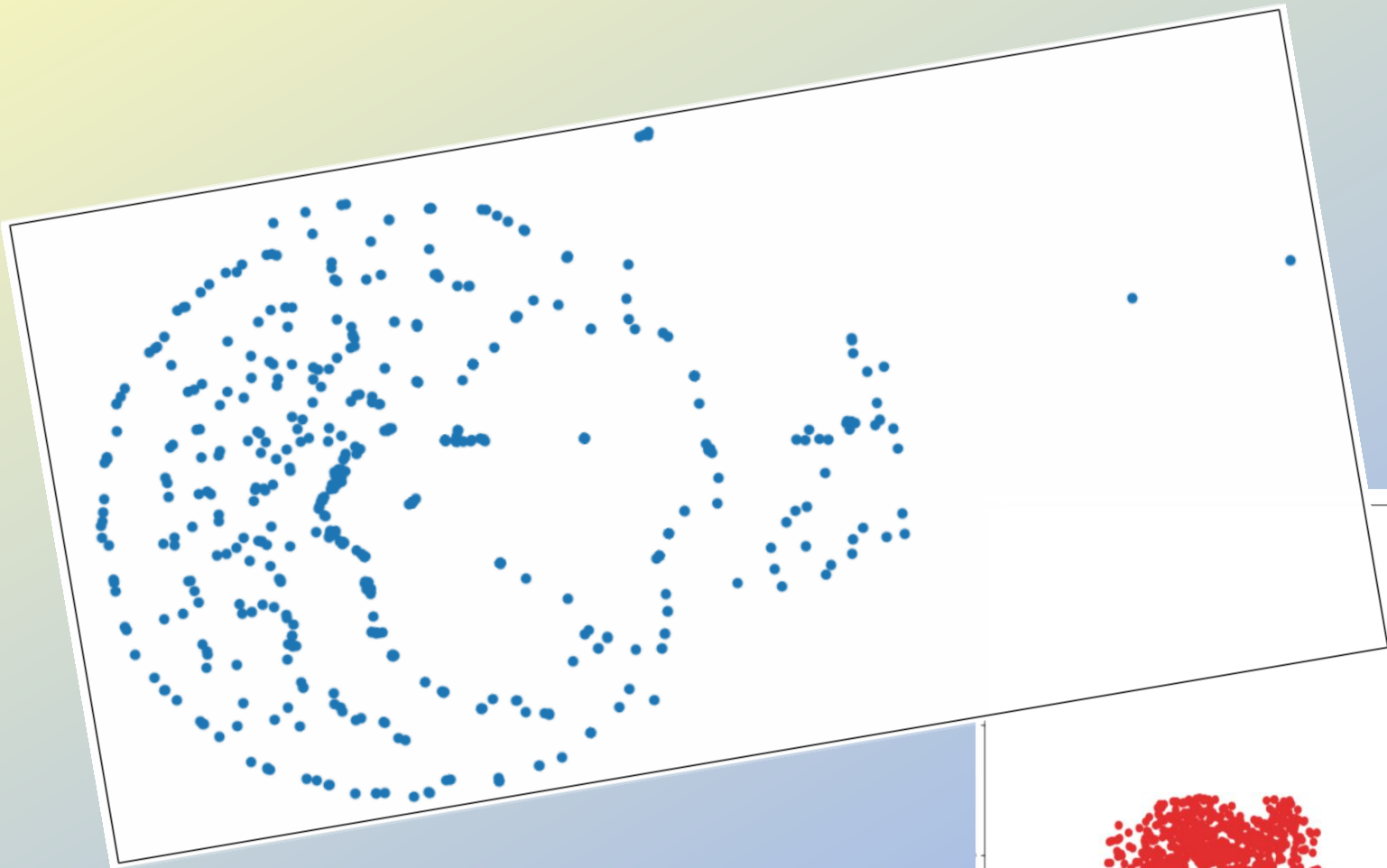


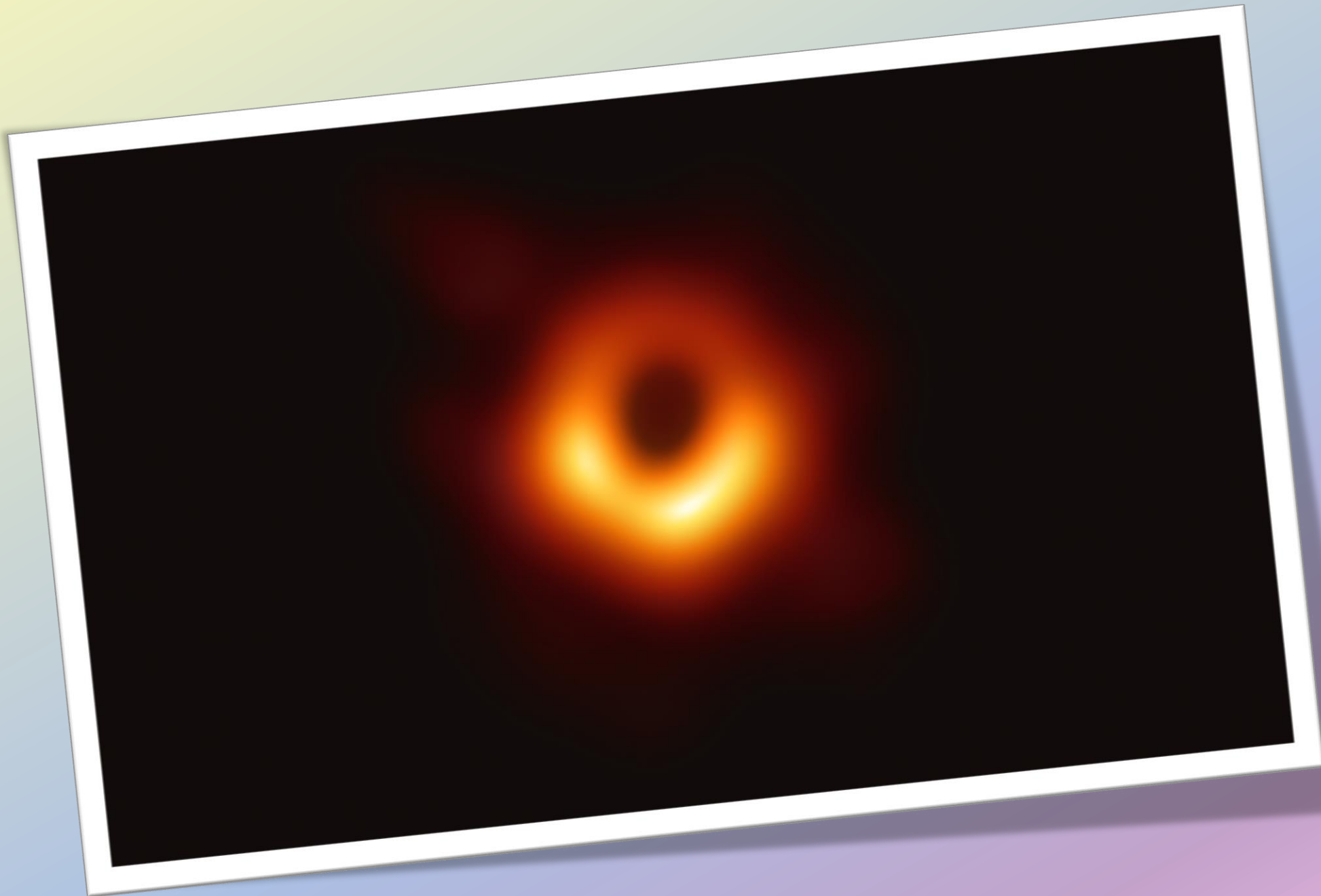
# AM Não Supervisionado



*Depois da busca de melhor forma de caracterização, fazemos a predição de transientes aleatórios;*







Obrigada!